SurviVAL of the fittest

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Award date:
1995

ERICSSON

Survi*VAL* of the fittest

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Heeze, November 1995

ABSTRACT

The objective of this graduation research project is to find out if Ericsson's latest logistic concept is feasible, based upon incurred effects of Value Added Logistics and justified by theory. The conclusion is yes. The benefits are gained by integral co-ordination. The VAL-structure is a way to make integral co-ordination of processes possible.

ACKNOWLEDGEMENTS

This report contains the elaboration of the graduation research project of Peter Wijffelaars at Ericcson Telecommunicatie BV. The graduation project has been executed as the final part of the curriculum of the Faculty of Industrial Engineering and Management Science of the Technical University of Eindhoven (The Netherlands).

Ericsson's VAL-concept has been the subject of inquiry. Two parties have been involved in this project, the European Supply and Customizing Centre (ESCC) in Rijen (The Netherlands) and Espania Comunicaciones de Empresa SA. in Madrid (Spain). Jan Spooren has been the supervisor at the ESCC. The Ministry of Economic Affairs has been represented by Remko van Hoek. The reason for this department to join this project is to gain information about promising developments in business such as Value Added Logistics. Bart Vos has been the first supervisor of the faculty.

At this place I would like to thank the Ericsson organisation for the possibility to execute this graduation research project in a progressive and hospital environment.

A number of people made contributions to this study. Out of all people who ought to be thanked, I would like to single out in particular Jan Spooren, Jos van Berkel, Eric Hoornick, Filipe Aranda and Rafael Berriocha.

Finally I would thank Bart Vos, Remko van Hoek and Ger Regterschot for their supervision during the graduation period.

Peter Wijffelaars

Heeze, November 1995

MANAGEMENT SUMMARY

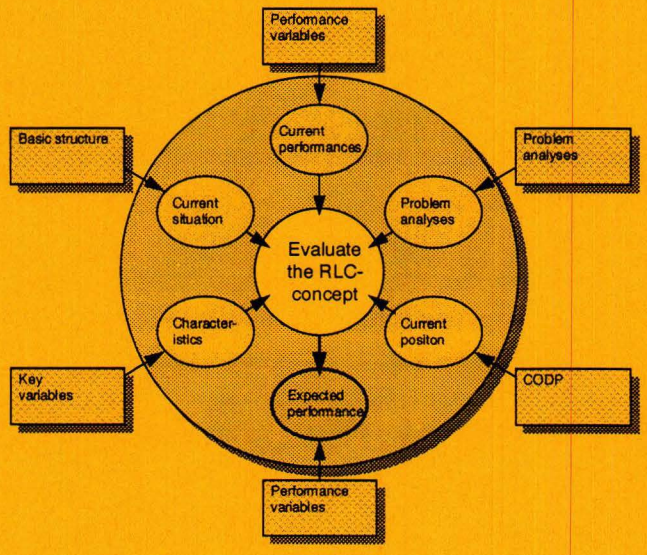
Project description

This graduation research project has taken place at Ericsson's European Supply and Customizing Centre (ESCC). The ESCC is Ericsson's first VAL-centre. A VAL-centre is an extra link in the pipeline. Its right to exist is an overall efficiency improvement and increasing effectiveness in the network. One of ESCC's objectives is to grow by expanding its activities. This is only possible when ESCC can take care for improvement of Ericsson's performances and sales-conditions. ESCC's wants to know if Ericsson's latest logistic concept is feasible, in theory justified and if it offers improvements for the participating local companies and ESCC, measured by customer service and reduction of costs.

The objective of the project is:
Indicate if Ericsson's latest logistic concept is feasible for the Spanish situation, based upon incurred effects of Value Added Logistics and justified by theory.

Especially the relationships between ESCC and the Local Companies (LC) is point of inquiry The approach which is shown in figure MS.1. The introduction of the RLC-concept in Spain is used as case because information about the total value chain was not available.

The project is devided in three parts. The process starts with the description of the current situation. The next is a theoretical evaluation of the RLC-concept. The last part of the case is the estimation of the performances, changed by the introduction of VAL in Spain.



Conclusions

Current situation
Investigation of the current circumstances has shown that VAL is feasible. The VAL-concept fits in the situation where ECE, the local company in Spain, has to deal with. The current situation has to be changed to reach the increasing market requirements. Therefor the logistic structure has to be changed. Current problems can be reduced by measures that have the characteristics of VAL and integrated control.

RLC-concept (VAL) versus theory
The comparison between Ericsson's RLC-concept and theory proves that this concept is theoretically justified. The VAL-concept is used by Ericsson to simplify the logistic structure. Reduction of the complexity increases the controllability leading to improved performances and reduction of costs. Stage two of Ericsson's VAL-concept is the first step into integral co-ordination. The biggest suggested change to reduce the complexity is the integration of the ESCC and the order-process related part of ECE into one organisation.

The remaining interfaces will be upgraded leading to an improved exchange of information and control of the primary process. Looking at other LCs it is questionable if these proposed levels of integration really work in practise. Too often the parties are busy with their own objectives, losing the global objective out of sight. From a logistic point of view the right decisions have been made.

The next step is to convince the people who are involved that the only way to create a win-win situation is to think global.

Expectations of the performances
The quantitative expectations show that the logistic costs will be reduced by ten percent. Much more important is the increasing delivery performances because the Spanish market is very demanding. The expected performances of an implemented RLC-concept are much better than the current performances.

The success of the implementation of the RLC-concept depends fully on the co-operation of the involved parties.

Recommendations

Integral co-ordination between ESCC and the LCs
The big advantage of the simplified structure is an potentially increased controllability. The simplified structure makes integral control possible. Sometimes it seems that the local organisations are not ready for integration yet. The success of the RLC-concept will be determined by the co-operation between all parties. Local thinking undermines the promising objectives.

So the next stage has to be integration of all concerned parties. This means not only on paper but in practise. The condition for integration is mutually confidence and co-operation. Integration downstream the RLCs is more a case of behaviour now the structure is prepared. Upstream is another story.

Integration between EBC and the RLCs
The lack-of-material problems showed the dependence of ESCC towards its suppliers. One of the more important objectives of the RLCs is to prevent that problems which occur upstream have a negative influence in the downstream direction. It is important that the material form EBC is correctly devided over the RLCs.

EBC is the largest and the worst supplier. Integration in this direction is hardly organised. In this part of the chain many improvements can take place by integral control. The advantage of integration is that market information becomes immediately available for every partner in the value chain. This makes it possible to adjust the efficiency driven order-flow from EBC to the latest developments in the market. Therefor all flows of material within the value chain can be improved.

Salient detail is that EBC also supplies the RLC which is located in Sweden as well . It seems that this RLC is better supplied than ESCC. The supplying units determine their own priorities.

Internal process of ESCC
The local market requirements are different. It can not be the purpose to adjust ESCC's internal processes and priorities to every local situation

Local stocks
Local stocks established in the "neighbourhood" of a RLC have no right to exist.

Expansion
ESCC can expand by:
- integration;
- assortment;
- geographically.

Extension of the assortment is preferable because of the modular product-oriented organisation structure of the ESCC.

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SURVI*VAL* OF THE FITTEST

Darwin

In his book "Survival of the fittest"[1], Darwin describes his evolution theory. Because the theory is no obligatory examination subject-matter at secondary school yet but will be soon here a short description for all those people who want to stay up-to-date. To describe all his ideas would take too much of your time. Therefore only the three most important conclusions will be mentioned. Darwin's theory concerns developments in nature. Is there any similarity with business? We will see.

Darwin's conclusions :

- the fittest survive:
  the environment is changing, only those who can adjust stay alive. This conclusion seems to be true, knowing that we haven't seen dinosaurs lately;
- the fittest multiply:
  this point is indubitable. If you don't survive it becomes impossible to get any descendants;
- the posterity inherits the typical strong characteristics from the parents:
  Darwin proves this by investigating the remaining of animals, birds in particular.

You will be asking yourself: What has this to do with logistics? Nothing? The title "Survi*val* of the fittest" is not only chosen for the letters VAL in it, meaning Value Added Logistics, the subject of this report. There is a similarity between nature and business based upon the theory of Darwin.

The conclusions:

- the fittest survive:
  the environment is changing, only the organisations that can adjust stay alive. The others will be beat by the competition;
- the fittest multiply:
  the strong adjusting companies do not only expand, also the ideas and concepts that make them successful attract the attention of others, another way of multiplying;
- the adherents take over the strong aspects of their examples:
  concepts that are proved to be good will be followed and nearly inquired. The posterity inherits the typical strong characteristics of their "parents".

Is Value Added Logistic a concept that makes companies "immortal"? Is Ericsson's European Supply and Customising Centre the fit parent that will have many descendants? This report describes the inquiry of the characteristics that make VAL a potential tool for winners. Walking in Darwin's footsteps.

chapter 1

ERICSSON

1.1 Branch of industry

Botter [2] classifies industrial companies in 16 different types. The division is based upon criteria such as: the client specific character of the assortment, complexity of the product and position in the industrial column.

The telecommunication industry is part of the installation-sector. This type of industry is characterised by the most complicated products which are at the same time highly dependant on customer requirements. These qualifications require special skills of the organisation as described in this paragraph.

Purchasing
Purchasing of components and sub-assemblies, and design of specific installations have to be closely interwoven with accurate short lead-times according the market requirements.

Acquisition, project-management
Sequential activities like acquisition of sales-orders, pre-calculation, working-out of tenders and specification take place at the same time when possible to shorten the project's lead-time. Detailed specifications are the most important sources of information during the project. Costs of personnel and material are usually most significant while costs of fixed assets in the production are relatively low.

Organisation
Lack of detail-planning, which is hardly possible in this branch due to the uncertainty of the product's structure increases the importance of horizontal communication. At the same time a high degree of improvisation, flexibility and decentralised authorities is essential.

Botter considers the telecommunication-branch as being one homogeneous market. This is not according to the reality. The telecommunication-branch consists several markets with different requirements, that is why Ericsson is divided in market-oriented divisions which will be the subject of the next paragraph.

1.2 Lars Magnus Ericsson AB. (LME)

Ericsson is one of the leading telecommunication companies in the world. The company started in 1876 in Stockholm and is now a multinational with about 75,000 employees and outlets in more than 100 countries [3] . Total sales in 1994 was 20 billion guilders of which 5.5 billion Public Telecommunications, 9.8 billion Radio Communications and 3.0 billion Business Networks.

Ericsson is both generalist and specialist in the telecommunication segment. Generalist because it covers the total telecommunication spectrum, specialist because it concentrates really on telecommunication only. Ericsson is market leader in cellular mobile telephony (40% of world wide network). Also in the areas of public telecom, business communication and defence it plays an important role. With this Ericsson belongs to the top five companies in telecommunication.

Many important markets are to be find within Europe. England, Spain, Italy, France, Germany, Sweden and The Netherlands are the most important countries on this continent. The total European share is 50% of the global sales.

In the markets Ericsson serves, the company performs as one single industrial unit, presenting one single interface to the customer. Operating in some of the larger markets, Ericsson has twelve Major Local Companies (MLC) that report directly to the Ericsson Executive Committee (CEO) (figure 1.1). Ericsson Telecommunicatie BV (ETM) in the Netherlands is one of those MLCs. In the remaining countries, Ericsson has Local Companies (LC), each of which reports to a manager assigned by the CEO. Local Companies are mostly serving in just one of the business areas.

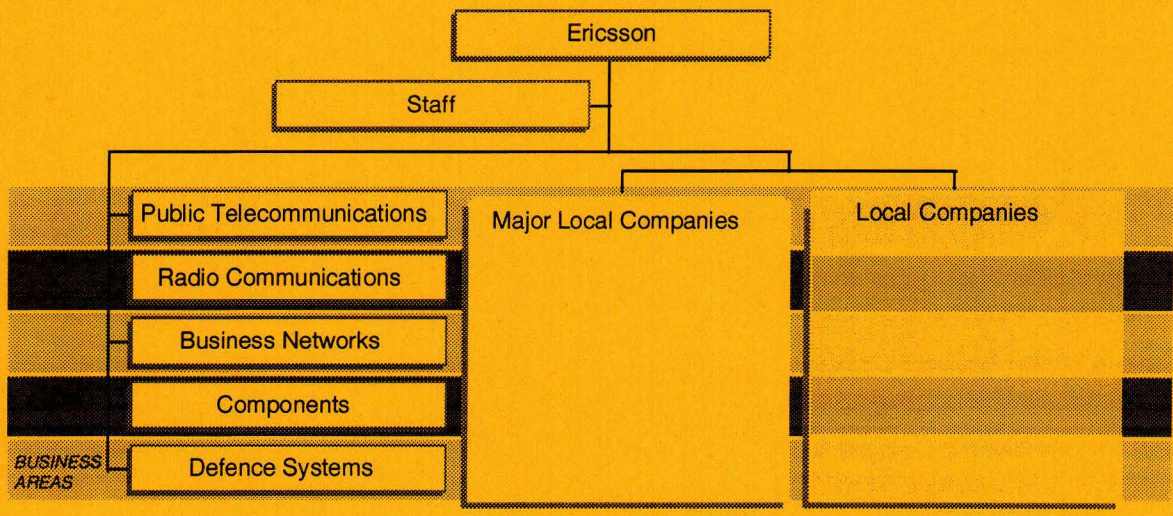


figure 1.1: Organisation chart Ericsson LME.

1.2.1 Business areas

Ericsson's activities are split up into 5 business area's (figure 1.1) :

- Public Telecommunications (BX)
  Systems and services for transmission of voice, data, text and images over public networks;
- Radio Communications (BR)
  Mobile telephone systems, mobile telephones, mobile voice and data communications systems, radio paging systems and defence communication;
- Business Networks (BZ)
  Systems and services for transmitting of voice, data, text and images over private networks. Planning and installation of communications and data networks, network products;
- Defence Systems (BD)
  Airborne electronics, local mobile defence systems, microwave and satellite communications;
- Components (BC)
  Serving especially Ericsson companies with microelectronics, power and standard components. Telecom cable, fibre, optical cable, power cable and special cable.

1.2.1.1 Business Networks (BZ-division)

This is the business area that is responsible for the production of among other things the MD110 (appendix 1), the product that is the subject of investigation.

The telecommunications market has changed significantly since Ericsson's business area organisation was established in the 1980s. Deregulation and privatisation have resulted in the appearance of new telecom operators. Another new customer category is represented by owners of large private networks. These developments place new demands on Ericsson's operations in the market.

Sales for this business area, which consists of 15,000 (20%) employees, amount to 3.0 (15%) billion guilders [3] . Europe, excluding Sweden is the largest market by far (68%). These results of 1994 are comparable with the years before. The market is characterised by continuing very strong pressure on prices.

MD110 is one of the business units. Others important units are:

- Small Business Systems
  The most important product is the Business Phone, designed for companies with a small number of exchanges;
- Business Mobile Networks
  Responsible for the Freeset products, a cordless internal communications system;
- Data Networks
  Supplier of the Eripax family, a data communication system for private networks.

1.3 Ericsson in the Netherlands

In 1893 the first Ericsson systems were used in The Netherlands. In 1920 Ericsson bought a telephone manufactory in Rijen. At this moment just about 1900 employees are working in Rijen, Amsterdam, Emmen, Enschede and Utrecht. The telecommunications company LM Ericsson AB is represented in the Netherlands by :

- Ericsson Telecommunicatie BV;
- Ericsson Radio Systems BV;
- NIRA Nederland BV;
- Ericsson Business Mobile Networks BV;
- Ericsson Data Services Nederland BV;
- Comnet Design BV.

All companies together sold for 641 million guilders in 1993.

1.4 Ericsson Telecommunicatie BV (ETM)

Ericsson Telecommunicatie BV (ETM) domiciled in Rijen is with its 950 employees the largest Dutch establishment. ETM belongs to the small group of Major Local Companies (MLC). These are a select group of Ericsson companies which are of great strategic and commercial importance for the international organisation. ETM is responsible for the development, assembly, distribution and sales of products which can be divided to three business areas BX, BR and BZ, serving the national as well as the international markets (figure 1.2).

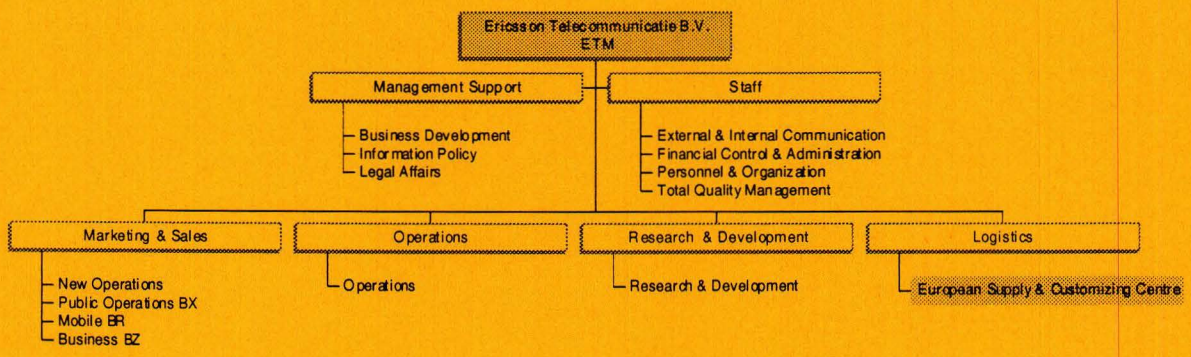


figure 1.2: Organisation chart Ericsson Telecommunicatie BV. (ETM)

Public Telecommunications (BX)

The public infrastructure, responsible for external data interchange is often owned and operated by one national operator. ETM supplies stations and develops system software for public digital telephone exchanges. PTT Telecom still has an exclusive concession for operating the fixed public telecommunications infrastructure. Till 1993 PTT Telecom had three main suppliers for this - AT&T, Alcatel and Ericsson - but has decided to continue with only AT&T and Ericsson. In the

future PTT Telecom will also lose its monopoly as public network operator what will lead to an increased market and reduction of prices.

Business networks (BZ)
The business market assortment includes all items that are installed at the end users place. ETM is the exclusive supplier of products for the business market via PTT Telecom. The main share of the turnover is gained by the sales of communication networks for business environments intended for speech and data communications consisting stations and telecommunication terminals. Despite the deregulation of the market PTT Telecom still holds a dominant position. This makes ETM market leader.

Radio Communications (Mobile) (BR)
The emerging mobile telecommunication market is the newest market that Ericsson serves. ETM is responsible for mobile telecommunications solutions for the public and business environments intended for speech and data communications. The national operator PTT Telecom has concessions for the operating of analogue (ATF) and digital (GSM) public mobile telephony networks. It currently has three main suppliers from who ETM is from the start the largest. The prospective for the near future are very promising because a second operator, Libertel also known as MT2 is authorised and has to build a new digital network.

The sales to the Dutch market remained stable over the last few years. Investments in infrastructure and business communications did not increase over the past few years. Volume did increase but prices decreased. Inter-company sales rose, resulting in a slightly growing overall turnover. ETM's turnover in 1993 stabilised at 450 million guilders.

1.4.1 European Supply and Customising Centre (ESCC)

The European logistic centre (ESCC) is set up in 1991 and handles the purchasing, customising and supply of mainly business communications systems and employs 160 people (figure 1.3).

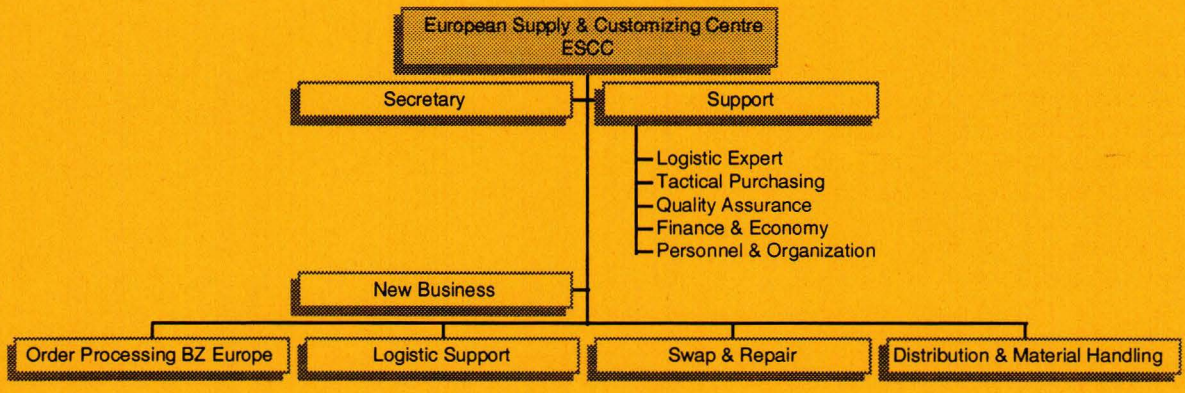


figure 1.3: Organisation chart European Supply and Customizing Centre (ESCC)

ESCC is Ericsson's first VAL-centre. Three other Regional Logistic Centres (RLC) serve the rest of the world. The three remaining areas are America (North and South), Australia and the rest of the world. Ericsson's VAL-concept was introduced in 1991. It has been evolved since, leading to more centralisation of logistic activities and an increasing assortment (appendix 2).

Detailed information about the ESCC will be described in chapter four.

chapter 2

PROBLEM DEFINITION AND PROJECT APPROACH

2.1 Introduction: Inducement for the ESCC to take part in the VAL-project.

This graduation research project takes place at Ericsson's European Supply and Customizing Centre (ESCC). The reasons to establish this VAL centre is described in this paragraph and is also the inducement for the ESCC to take part in this project.

Until somewhere in the region of 1990 Ericsson was focused to supply monopolistic PTT-like organisations all over the world, especially Western Europe. Public Telecommunication was heavily dominating. As most of the PTTs were government owned companies in those days, business and political factors were strangled. To be able to get contracts it was required to create work in that country. For that reason Ericsson had production facilities in all important countries which were able to fulfil the local demands. This resulted in just about 70 factories all over the world at the beginning of the current decade.

In the eighties (1980 - 1989) the first big changes in processes and products became clear. The most important change here is the *demonopolisation* in public telecommunication and radio communication. At the same time the need for telecommunication grew and changed. There came a heavy increase in radio communication and an increased demand for 'total solutions'. On the other hand also competition and, as a result, *pressure on prices* became more fierce. These facts forced Ericsson to change over from a somewhat bureaucratic way of working in a political environment to a commercial oriented approach under heavy competition both on price and customer service.

As a logical consequence the sourcing strategy was changed. With the demonopolisation the pressure to local production is taken away. Due to heavy competition, increased pressure on continuos efficiency improvement is a fact. As a result Ericsson started to change the concept by specialisation in dedicated factories. Due to this approach and the rapid efficiency improvements the number of factories in Europe will be reduced to 25. This process is stimulated by the *opening of the borders* within the European Union (EU).

Also ETM stopped the relative low volume production for deliveries in the Netherlands as a result of the reduction of production facilities. It promoted itself for "European" sourcing unit for a certain range of products (appendix 2). This resulted in the foundation of the ESCC the sourcing department of ETM. ESCC concentrates on customising, cable and cabinet assembly, test and swap/repair of business network products for Western Europe. This customising centre is the first "Value Added Logistic Centre" within the Ericsson organisation. This relative new promising department has to prove however its right to exist. And because it wants to expand its activities it has to convince other links in the chain.

Centralisation of the logistics is a group of new activities. Implementation of this extension of the VAL concept takes place at this moment in several countries.

2.2 Problem-definition

The ESCC is an extra link in the pipeline. Its right to exist is an overall efficiency improvement and increasing effectiveness in the network. One of ESCC's objectives is to grow by expanding its activities. This is only possible when ESCC can take care for improvement of Ericsson's performances and sales-conditions.

ESCC's problem is that it wants to know if Ericsson's latest logistic concept is feasible, in theory justified and if it offers improvements for the participating local companies and ESCC, measured by customer service and reduction of costs.

2.3 Objectives

The objective of a project is to gain solutions for the defined problem.

Indicate if Ericsson's latest logistic concept is feasible, based upon incurred effects of Value Added Logistics and justified by theory.

Especially the relationship between ESCC and the Local Companies (LC) is point of inquiry.

2.4 Problem analysis

The problem that has to be solved in this project, is the question if Ericsson's logistic concept is feasible, based upon incurred effects of VAL and theory. The problem analysis contains several stages:

- inventory of the problems;
- clustering;
- possible measures.

The first stage is not mentioned here because it does not make any sense to write down the problems twice. It is important to link several problems because they might have the same causes. The solutions of the problems depend on the business-level were they occur (figure 2.1).

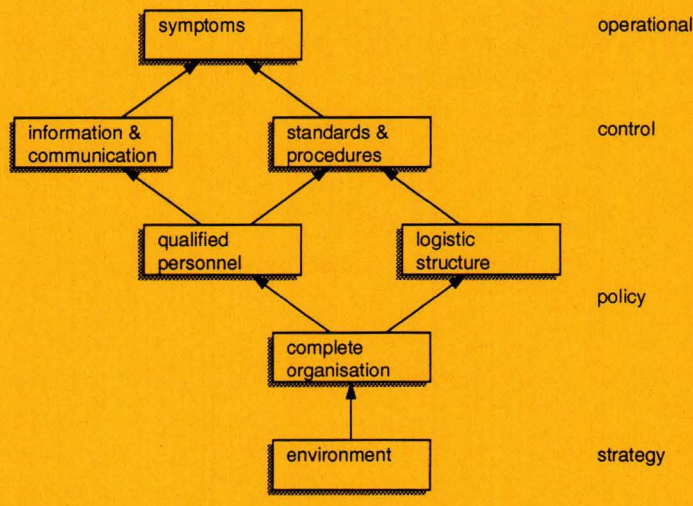


figure 2.1: Relationships between problems and the level of interference

symptoms:
- "too much" capital is occupied (by stocks);
- delivery performances are not always according to the market requirements;
- product quality can be improved.

environment:
- customers requests and requirements are increasing.

These are the most important problems. Most problems are related to the logistic structure, the investigation subject. The impact of problems caused by the environment can be reduced by adapting the logistic structure. An accurate reconsideration of the current concept is a possible measure to solve the reported problems.

2.5 Project approach

The best way to evaluate a logistic structure is by using the knowledge to design one. That is the reason why the general approach that Hoekstra and Romme [4] describe will be used. They advise to consider all six points of attention reflected in figure 2.2.

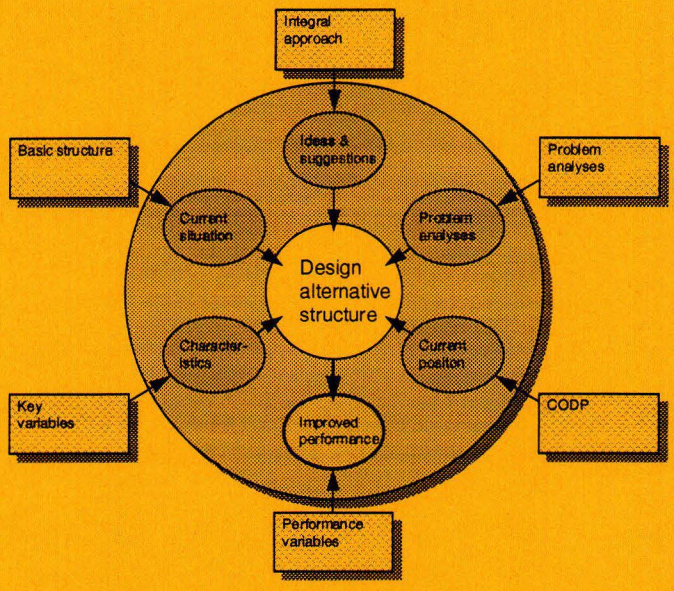


figure 2.2: Approach I: points of attention

Simulation will be used to investigate the influences of VAL. The reason to use this method above an analytical approach is the power to simulate the dynamics of the concept. The impact of changes in the parameters are easier and much faster to figure out. The role of simulation in this project is showed in the next figure (figure 2.3).

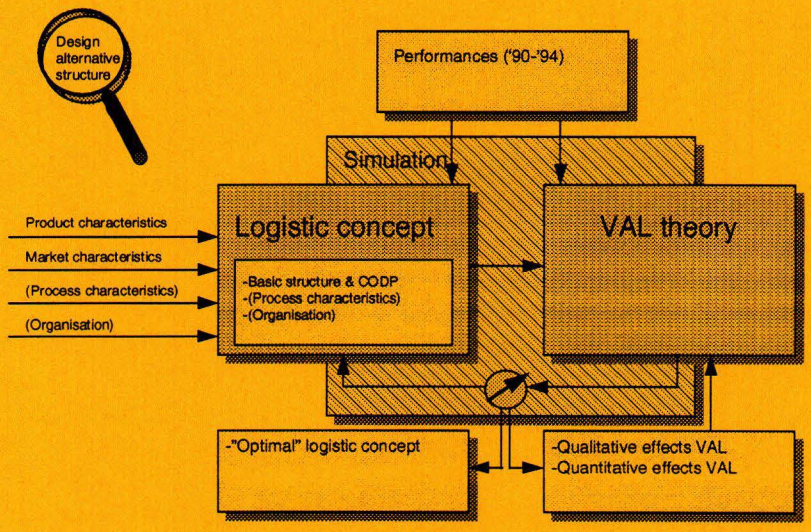


figure 2.3: Approach II: Evaluation of the concept by using simulation

The approach is devided into two separate stages:

- pre-simulation (analytic);
- simulation related activities.

2.5.1 Pre-simulation

First the key variables will be investigated. These characteristics determine the requirements. Product and market characteristics are not influenced by the logistic concept and are therefore autonomously. The organisation and process variables determine the concept, but are on their turn

influenced by the concept. The second stage is to investigate the current situation of the logistic concept, describing the basic structure and the Client Order Decoupling Point (CODP). The third phase is the registration of the performance in the past years. Changes in the figures have to be explained. The fourth stage is to relate changes in the organisation with significant changes in the performance. The VAL-theory can help searching for relationships between characteristics, decisions concerning the logistic concept and the overall performance.

2.5.2 Simulation related activities

Translation of the current situation into a simulation model in a way that the most important variables can be measured is the first stage. The performances of the model have to be compared with the actual figures to check the reliability of the model. The next stage delivers important information: adapt the situation step by step using the VAL-theory and register the new performances.

After changing all important variables in the structure as well as the product and market characteristics, the effects of VAL should be clear. The results have to be recorded in a model that describes the relationships. With the obtained information the most feasible structure can be designed. Finally the Ericsson's and the alternative concept have to be compared to investigate if the problems mentioned in the analysis can be solved and to check if Ericsson's logistic concept is the best for the current situation.

2.5.3 Limitations

Several limitations make the proposed approach not practicable:

- data:
  - simulation requires more information than is available;
  - figures can hardly be compared because of the large number of important changes, local companies did for instance not hand over their activities at the same moment ;
  - effects are not immediately visible;
  - figures might not always be reliable due to reorganisation costs and aftermath effects;
  - effects are spoiled by the use of transfer prices which also have been changed;
  - the variation in registered figures in earlier inquiries [5] is big. This shows that there might be confusions about the meaning of concepts;
  - lack of foreign figures;
- limitations of simulation:
  - a lot of important issues can not be simulated (appendix 3). Only the performances of order-driven activities can be simulated. The control activities (very important) can not be simulated;
  - analytic approach remains necessary;
- model building:
  - personnel (majority of the costs) is a flexible variable which is hard to simulate because the "capacity" is alternatively applicable;
  - transport distances and times are not decisive, just like in many other simulation projects;
  - capital costs are after personnel the largest. Stock levels are mainly determined by control. Stock control is according experts hardly to simulate;
  - inbound and outbound material flows are not related due to the decoupling stock;
  - it is impossible for a lot of changes in the concept to make them visible because they concern control activities for instance;
  - the actual situation has to be simplified too much, to make simulation possible;
  - bottle necks in the order process are relatively easily to solve because the activities are not capital intensive but mostly personnel related.

Conclusion

The majority of the efforts will be consumed by the simulation related activities while the conclusions based upon simulation results will be limited. The remaining conclusion has to be based upon analytical investigations and assumptions. The added value of simulation is small. The results might show a suggested accuracy which is not true. Hillen [6], designer of Taylor simulation software, says that when not all requirements are available or when there is another possibility to solve the problem do not simulate. The stages he describes in his general approach

also include a go/no-go decision. In this project is chosen for a "no-go". Simulation will not be used because it does not generate the solution for the problem. *Simulation is not an objective but a tool!*

2.6 Alternative

The listed problems show two important limitations:

- lack of reliable (foreign) information make a consideration of the total network including suppliers, EBC, ESCC and all LCs impossible;
- preparations for building the model showed that simulation will not contribute what was expected.

The alternative approach has to deal with the two major limitations. Only a part of the network has to be chosen as case which can be approached analytically. The case that fits these requirements is found in the implementation of the RLC-concept at Espania Comunicaciones de Empresa (ECE); the Spanish Local Company of the Business-division.

The objective of the project is slightly changed. It is focused on the Spanish situation. Therefore not all conclusions will be valid for all countries served by the ESCC.

Indicate if Ericsson's latest logistic concept is feasible for the Spanish situation, based upon incurred effects of Value Added Logistics and justified by theory.

ECE is chosen because the initial stage of the implementation process takes place during the same period as this graduation project. Therefore the commitment is expected to be high what will stimulate the information supply. Another advantage is that the figures are recent and not spoiled by run-up problems. The approach is described in chapter 5.

What does the implementation at ECE concern? The current situation in Spain is characterised by the use of standard projects (Ibercom packages, appendix 1). The packages are supplied by the ESCC but often have to be customised in Spain. The additional material is delivered on order by the ESCC as well as from the local Spanish stocks. The CODP is located at the ESCC. There is however a second CODP in Spain. The delivery of fully customised projects from Rijen, shipments via a local Hub and centralisation of logistic control by the ESCC are characteristics of the intended situation.

chapter 3

VALUE ADDED LOGISTICS

3.1 Definition

Value Added Logistics (VAL) is a recently introduced concept. There are several descriptions of this definition. Some examples are:

- VAL is an industrial-logistics concept, where the global network is divided in on the one hand primary production of components, aggregates and modules and on the other side secondary production meaning assembly and customising. (Kornegoor and Radstaak [7])
- VAL is the combination of production processes with distribution activities leading to decreasing costs and improving service. (Nederland Distributieland, 1993 [8])
- VAL is a kind of business-organisation which is characterised by a specific structure of the chain of value. This structure consists of a postponed manufacturing; adding value and complementation of the orders in a downstream direction. Logistic and service activities are moved in an upstream direction. This results in functional de-specialised VAL-centres (van Hoek, 1993 [9])

The essence of the definitions is: VAL is a logistic concept where production is split in two different parts kept together by centralised logistics. The first part, primary production is responsible for the production of sub-assemblies and all components used in those items. This production is fully efficiency-oriented and therefor forecast-driven. This makes globalising and outsourcing possible to reduce costs. Time is less important in this stage. The second part consists of customising, final assembly on customer-order. The objective is to produce as effective as possible including high delivery performances towards the market. Both types of production are part of the primary process and decoupled by stock (Client Order Decoupling Point (CODP)). The contents of the stock is the output of the primary production, modular sub-assemblies, and the input of the secondary production. The locations of the secondary production and storage are combined to reduce time and costs spend on transport.

VAL is in The Netherlands also known as "Indistributie". The difference between both definitions is not described. VAL and "Indistributie" are concepts where distribution and production are mixed. Therefore two parties can be involved, manufacturers and transport-companies Both see the new concepts as new challenges. The difference between the two definitions is based upon the party that takes the initiative. Is the concept approached from the transport-companies point of view than VAL is used in the other situation "Indistributie". Because it concerns the same logistic approach there is no need to use both definitions. Therefor only the most respected definition will be used in this report: VAL.

3.2 The inducement of the VAL-concept

Several trends in the current environment make VAL a useful concept to reduce costs and increase performances.

3.2.1 The demanding market

The market is changing and causes reconsideration of the market strategy as well as the logistic concept. Customer become more demanding. There is only place for suppliers who can deliver according these requirements. The customer asks for:

- more variation;
- improved adjustment to the clients requirements;
- new improved products;
- shorter time-to-market;
- more service.

The development is visible in almost any market and is expected to be continued[10] .

3.2.2 Consequences for the suppliers

The developments on the market describe a spiral effect. The customer increases his requirements. The competition on the market stimulates the industry to adjust their products and service, resulting in an improved supply. The improved service spoils the customer who will increase its requirements as long as the competition will stimulate this process.

Increasing competition makes it harder to reach the Break Even Point (BEP) on time due to:

- price-erosion and decreasing market shares (figure 3.1);
- an increasing assortment (figure 3.2);
- shortened lifecycle times of products (figure 3.3).

The shaded areas in the figures reflect the lice-cycle profits. The grey lines show the changed situation. The reduction of the lifecycle times of products is a direct result of the spiral effect which is just discussed and makes it necessary to reach the BEP earlier. Price-erosion and decreasing market shares are a result of an increasing supply by the competition. This results in a reduction of the number of fast-movers, therefor it takes more time before the investments are paid back, the break-even-point (BEP) is moved further in time.

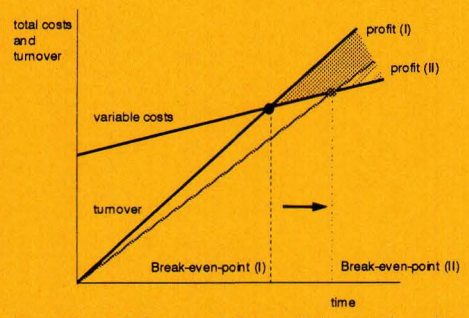


figure 3.1: Influence of the declining market share and decreased prices

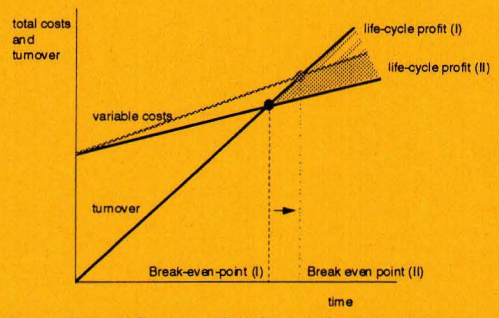


figure 3.2: Influence of an increasing assortment

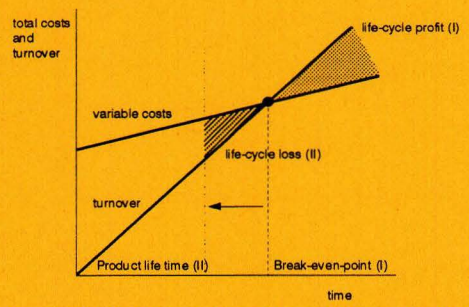


figure 3.3: Influence of reduction of the product lifecycle time

Was in the past the BEP dependant on the sales volumes. Nowadays time is the determining value because lifecycle times are much shorter. The supplier is forced to reduce the pay-back-time by:

- expanding the market by globalising;
- reduction of costs by specialisation and centralisation.

These strategies are described in the next paragraph.

3.2.3 Solutions for a demanding market

Companies see globalising and specialisation as solutions to survive in a demanding, dynamic market.

3.2.3.1 Globalising

Global logistics is described as a development that companies under pressure of international competitive production- and distribution-processes organise in a way that these processes take place there where the cost/quality-ratio is optimal [11]. Globalising is stimulated by three major tendencies [12]:

- internationalising and globalising of the global-market;
- inter-dependency of world-economies;
- growing number of international competitors.

The objective of globalising is to expand the market and to reduce the costs, so the BEP can be reached earlier in time by an increased margin and turn-over (figure 3.4).

Globalising in Europe is supported by the establishment of an internal European market that essentially guarantees the free movement of goods and currencies. Opening of the European borders makes it more profitable to centralise, serving all customers from one central location. The requirements in the several countries are however still different, Europe is not a homogenous market for many products.

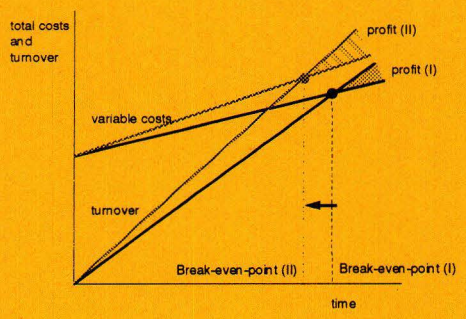


figure 3.4: Influence of globalisation

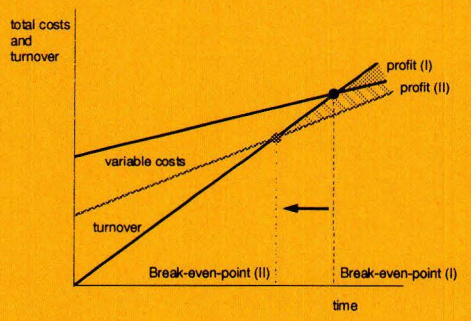


figure 3.5: Influence of specialisation

3.2.3.2 Specialisation

Specialisation leads to cost-reduction because of economies-of-scale, so the BEP can be reached earlier in time (figure 3.5). Specialisation is only profitable when non-core-business activities are sourced out to companies who produce at lower costs. Concentration on core-businesses leads to lower total costs because the fixed costs are reduced. Fixed costs decrease because less investments in machinery and educated people is needed for production. Production costs reduce. The material costs on the other hand will increase because more value is added by suppliers. The result is that fixed costs become variable, what is just as important when uncertainty increases.

3.2.3.3 Centralisation

An increasing assortment and shortened life-cycle times do increase respectively the stock-levels and the number of obsolete products. Due to the growing number of product variances it becomes more difficult to forecast the sales of products because they have become slow movers. By moving the contents of the local stocks upstream in the value chain in regional or continental storage's the uncertainty will reduce. In order of occurrence the benefits are:

- less slow movers, circulation rate increases;
- less uncertainty;
- stock-level reduction;
- less capital employed;
- less obsolete products;
- lower costs.

Physical Centralisation of stocks is not always necessary to gain profits. Due to centralisation of control the same improvements can be achieved. Although the stock is located at different places, it can be considered as being one because it is possible to control the total situation from one position [13].

Due to fewer internal barriers in Europe, and the advantage of increased control and lower costs, companies are rationalising their operations with centrally located European Distribution Centres (EDC) and production facilities. The objective is to lower the costs by moving local stocks to one location, and create economies-of-scale in distribution and secondary production.

3.2.4 Constraints

Globalising, specialisation and centralisation are limited by:

- time-to-market;
- increasing material-flow;
- country specific character of the products.

Time-to-market is an important determining constraint. If the total lead-time is more than the time-to-market than the concept will fail. Reduction of the time-to-market and specialisation go along together. Specialisation leads to division of the production in at least two parts:

- primary production;
- secondary production.

Primary production is often sourced out to specialised contractors. Secondary production, the order driven production and supply of the end-product, is controlled by the company itself to maintain the knowledge and control. The two kinds of production are decoupled by a stock. The lead-time is now mainly determined by the secondary production because the decoupling point (CODP) is placed before the final production.

The transport-costs increase by the growing *material-flow*. The trade-offs in global logistics are costs of transport, stocks, material and manufacturing. The transport-costs (supply to customer) increase while the other costs decline due to economies of scale. Globalising and specialisation are furthermore promoted by reduction of transport-rates due to over-capacity in the transport branch.

The advantages of centralising depend on the *country specific character of the products*. Centralising of stocks only has benefits when the stored products are supplied in the majority of countries which are served by the central stock. Only in that case stock-reduction takes place because variances in local demand are levelled. Centralising country- or even client-specific products has no positive influence at all. Further centralisation brings only profits when products can be customised at that central location. This brings us to a possible solution for the supply of modular land- or client specific products: VAL.

3.3 VAL, a solution to deal with the constraints

VAL is a solution for the dilemma between scaling and globalisation of production, centralisation and distribution at one location, and a more varied demand with short delivery-times. The essence of VAL is the division of production in primary and secondary production. Secondary production determines the time-to-market. By moving the secondary production including the CODP to a central location, a distribution centre for instance, the requirements of the market can be served. VAL is the integration of distribution and production.

Globalising, specialisation and centralising are the tools to increase the companies result. For demanding markets these concepts can not always be used at the same time. VAL can be the answer.

3.3.1 Contents of the concept

A logistic structure designed according the VAL-concept contains:
- primary production;
- secondary production;
- decoupling stock.

3.3.1.1 Primary production

The objective of primary production is to supply modular sub-assemblies at lowest costs as possible. The production of the sub-assemblies is efficiency oriented and therefor forecast driven. Primary production is often sourced out [10] because the benefits of specialisation and globalising which are already described. Time is not relevant, reliability however is.

3.3.1.2. Secondary production

Secondary production takes place there where the goods-flows come together in a central distribution centre to customise the products according customer-orders. The objective of secondary production is to supply end-products according the market requirements. This means:
- customised products;
- in-time;
- high quality.

The secondary production is effectively based and therefor order-driven. The lead-time of the order-process, the secondary production and transport to the customer determine the time-to-market. The lead-times are therefor very important.

The need for *customised products* is determined by the market. About how to customise Pine [14] writes; "The best method for achieving mass customising - minimising costs while maximising individual customisation - is by creating modular components that can be configured into a wide variety of end products and services. Economies of scale are gained through the components rather than the products; economies of scope are gained by using the modular components over and over in different products; and customising is gained by the myriad of products that can be configured."

Usage of modular components (sub-assemblies) combines standardisation of components with a wide variety of end-products. Standardisation is responsible for reduction of costs due to:
- low inventory;
- short assembly times;
- simplified (stock-) control.

Secondary production, the order-process and transport-time to the customer determine if the products arrive *in time*. Secondary production (customising) can be accelerated by using modular components. The order-process contains pre-logistic activities like product specification. Time can be reduced by standardisation and improved communication. The transport-time depends on the location of the VAL-centre and the means of transport.

Centralising of activities does increase the scope of the learning-curve. It also gives the product-management the possibility to concentrate on just one process instead of multiple. Both will lead to an *increasing quality*.

3.3.1.3 Decoupling stock

The objective of the decoupling stock is to split the production in two separate controlled parts. It is the buffer that has to avoid that problems upstream have a negative influence on the performance downstream. The strength of the VAL-concept is the combination of the secondary production, distribution, stock and the CODP at one location. This combination has a several advantages:
- no external transport between stock and assembly;
- location near distribution makes it possible to use the already existing facilities for other purposes than only customising (delivery of service parts and add-on material);
- centralisation of control leads to several benefits such as improved delivery performance and reduction of stock-levels.

The contents of the stock are sub-assemblies for the customised products, service-material and additional material. The VAL-centre can be used for more than only the supply of customised products because all facilities like housing, automation and qualified people are already there.

The location of the VAL-centre including the decoupling-stock is determined by
- time-to-market;
- inbound;
- sales;
- infrastructure;
- professional distributors;
- business attitude;
- economical climate;
- tax arrangements;
- labour costs.

3.3.2 The "VALidatie" model

Figure 3.6 on the next page is an adapted version of a conceptual framework that has been drawn up by van Hoek [15]. The concept VALidatie is a combination of the Dutch word validatie, meaning validity and VAL. This model shows what the most important changes will be and how performances will be changed (positive or negative relationship). The VALidatie model has not been proved on a large scale yet and therefore still an outline.

The VALidatie model on the next page has to be used in this way:
- product, market and process variables are listed at the top and bottom of the model;
- the direct influence of these variables are showed by dashed lines;
- the relationships are dark when the relationships are positive and grey in the opposite case;
- finally the related variables lead to changed performances which are shown at the right site of the model.

Stage I and II refer to the two latest stages of Ericsson's logistic concept (see chapter 4) :
- introducing VAL, establishment of the ESCC, central customising;
- centralisation of logistics, regional logistic process controlled by ESCC.

It is not the intention of this project to prove the VALidatie model.

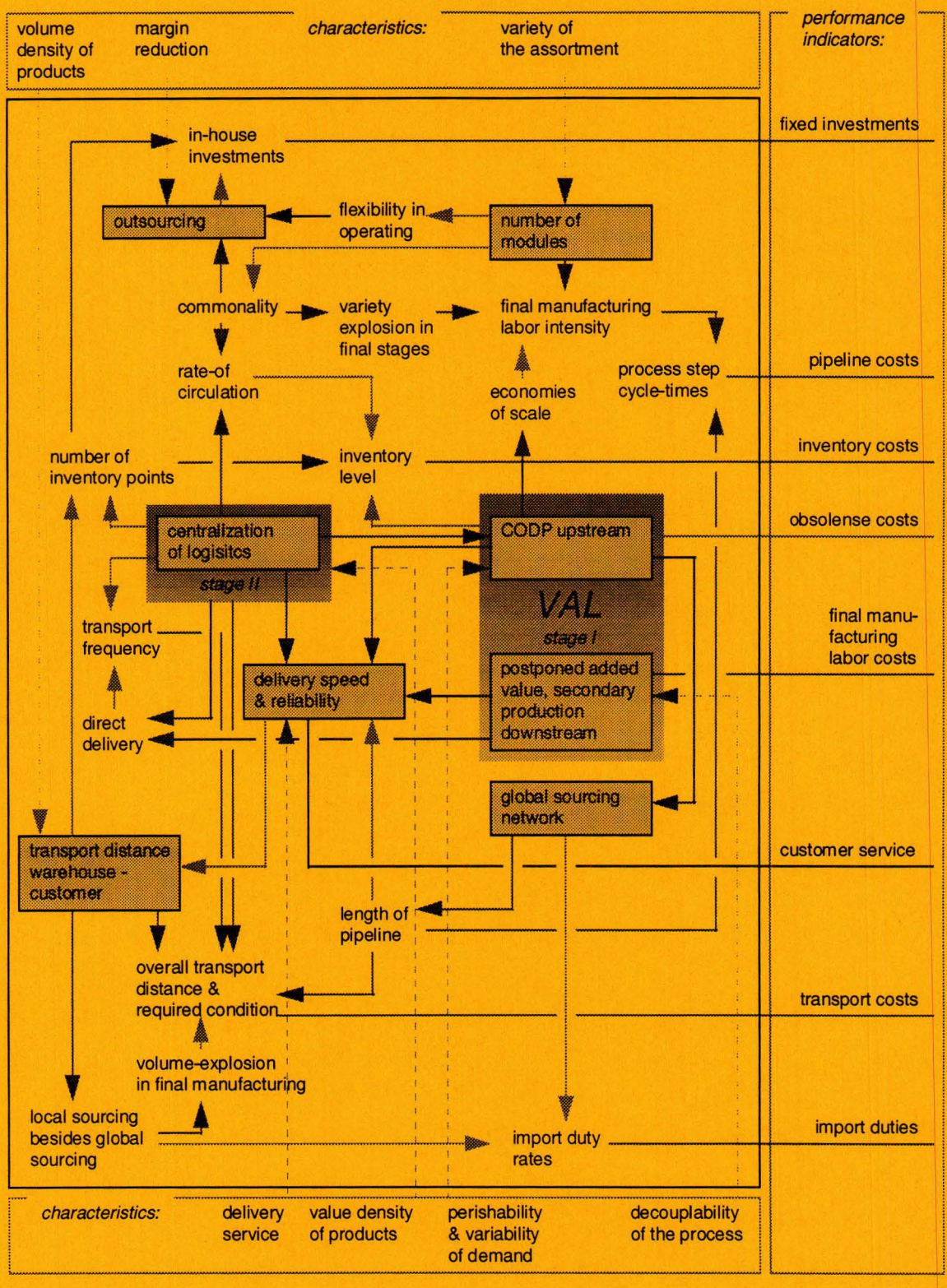


figure 3.6: Adapted version of the VALidatie model (concept)
source: van Hoek [15]

chapter 4

ERICSSON'S VAL CONCEPT:

RLC (REGIONAL LOGISTIC CENTRE)

4.1 Evolution of the logistic concept

The logistic set-up for the manufacturing of business systems passed different stages since the introduction of the MD110 in the late eighties. In this section each stage will be described to make a clear view of the evolution of the logistic concept

4.2 stage 0: Introduction of the MD110

Ericsson introduced the MD110 (appendix 1), a telecommunication system for the business market in 1988. Each local company had in those days a high level of autonomy and was responsible for almost the whole order supply process. They maintained the contacts with the customers, specified the sold systems and purchased the items they need.

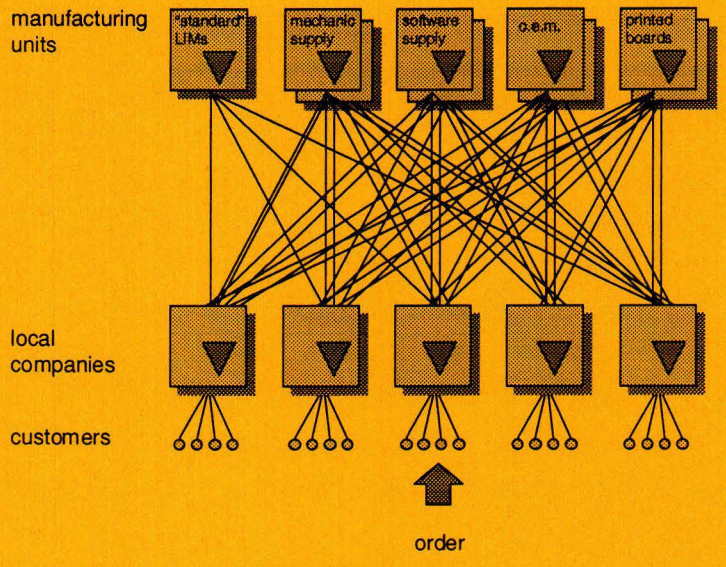


figure 4.1: Goods-flow stage 0

EBC (Ericsson Sweden), the major supplier, build the partly order-driven "standard" systems which were delivered to the local companies. Partly order-driven because it was the purpose to assemble on order but this could not be realised. The market did not allow a long time-to-market. The solution was a local stock with several types of "standard" systems. Each time one was sold another similar project was ordered in Sweden. In the meantime a system from the stock was re-assembled according to the real requirements. Rebuilding meant changing printed boards and adding finished goods. After the installation on site the ordered standard systems were delivered from EBC at the LC. The Client Order Decoupling Point (CODP) was in practice placed at the LCs although it was meant to be at the production of systems in Sweden.

This method had a lot of disadvantages. The working method was time, cost and capital consuming. Also the quality of the end product could not be guaranteed. The standard station was tested (system test) but the test results were no longer valid after the reconfiguration. This procedure made it necessary to repeat the test after the project was re-assembled (pre-installation test). The general product management had no fully control on installed bases because of this decentralised customising. The advantage was however that a quick response was possible.

Major local companies such as ETM and large local companies had their own production facilities. Manufacturing of cables and printed boards were a few of the production activities besides assembly and testing. These corporations were suppliers for other local companies (figure 4.1). The reason for the decentralised production was caused by the market characteristics. Ericsson was focused on supplying monopolistic PTT-like organisations. As most of the public telephone companies were government owned companies in those days, business and political factors were heavily strangled. To be able to get contracts it was required to create work in those countries. Combining the manufacturing activities in a few places to improve the efficiency was not possible. The result was that at the end of the eighties just about 70 factories were established world-wide. Once settled in a country the margins were good. This released the pressure to improve the efficiency. The economy of scale was low due to the decentralised manufacturing and assembly.

4.3 Stage 1: ESCC

European Supply and Customising Centre (ESCC) started in 1991. One of the reasons to reorganise was the changing market. Demonopolisation of national telephone companies what resulted in a decreased political influence made it possible to centralise production and assembly. Increasing competition, more small customers and declining margins made it necessary.

It was obvious that Ericsson had to change its scope from the political world to the commercial market. K. Pettersson[16] mentions four reasons for Ericsson to introduce Regional Logistic Centres:

- reduction of costs;
- reduction of time-to-market;
- close to the customer;
- new business opportunities.

The centralisation will bring down the number of factories from 70 to 25 within 5 years. In Western Europe all local companies stopped the production and assembly of the MD110 projects. Also ETM has stopped the printed circuit boards production for the MD110. In exchange for the lost of these activities and the good geographical position the customising activities have been concentrated in Rijen at the ESCC. In the global distribution concept a clear split has been made between manufacturing units in Sweden such as EBC/S, that are fully efficiency oriented and logistic units that are customer order driven (LCs) (figure 4.2). Manufacturing of sub-assemblies is based on forecasts. The CODP is moved to ESCC. The manufacturing units may be other Ericsson companies or external suppliers.

Customer specific solutions are assembled at the ESCC in close contacts with the local companies. The local companies have the final responsibility to the end customer and take responsibility for sales, specification, installation and service. Much attention has been given on forecast quality, order routines and especially quality of the technical specifications. Testing of customised projects at the ESCC makes direct shipments to site possible. Other advantages are an improvement of the product quality and the delivery performance, increasing economies of scale in production and assembly. The capital employed in production and stocks is decreased by reducing the delivery time and number of items on stock.

The foundation of ESCC had a major influence on the order supply process. Activities that are taken over by ESCC came from EBC (assembly) and the LCs (customising). The forecast driven operations at the LCs remained almost the same except the manufacturing of the sub assemblies were transferred. The loss of the local manufacturing and customising operations did decrease the total amount of work. At EBC the production of subassemblies increased.

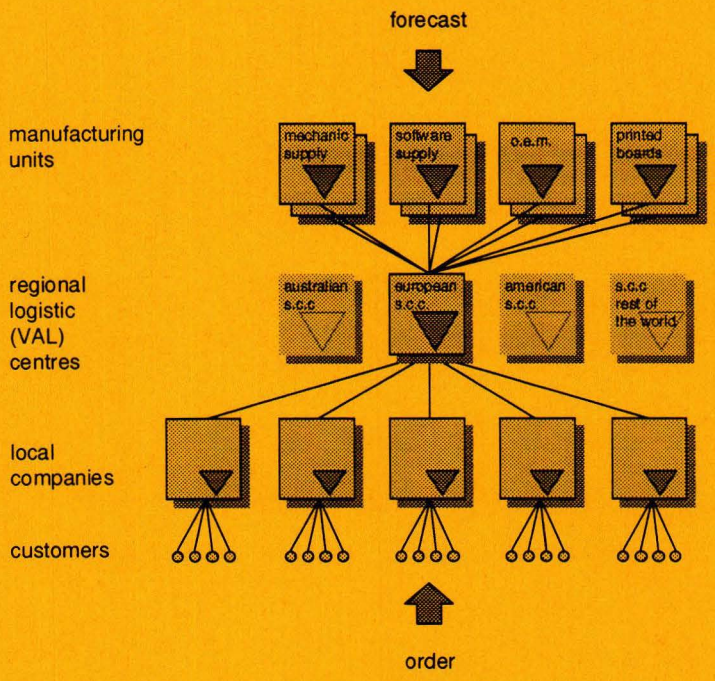


figure 4.2 Goods -flow stage 1

At the first part of the order driven order supply process especially the specification activities at EBC changed because they stopped order based production. The second part shows the biggest differences. EBC as well as the LCs lost respectively their assembly and re-assembly because ESCC assembles and customises in one operation. Order intake, technical control, sales-order administration and planning are taken over from EBC by ESCC. Because of the centralisation of the customising operations it is possible to combine the system- and pre-installation tests at one place. Re-assembly and standard systems on stock are no longer necessary. After the pre-installation test the project can be shipped to the site via the LC.

The most important advantage of this stage is that there became a clear structure in the production and supply process (compare figures 4.1. and 4.2). The simplification of the structure decreases the need for control. The simplification makes it possible to introduce the next stage: centralisation of logistics.

4.4 Stage 2: Centralising of logistics

In this latest stage ESCC is expanding the VAL-concept. The ESCC increases its importance by pulling the control in its own direction. Only a few local companies are already reorganised according this latest concept. The mean goal of this concept is to centralise as much as logistic activities as possible. ESCC will become responsible for the control of purchasing, order handling, planning, stock and shipping. The physical stocks will be moved to Rijen when possible. Country-specific items will be stored at a local warehouses and administered by ESCC/X, ESCC's local subsidiaries. The stock is controlled by ESCC. Drop-shipments from ESCC to the site generated some difficulties such as extra co-ordination of deliveries from different sources to the same site at the same time. In stage two the local warehouse will be used for consolidation purposes to overcome the co-ordination problems. The customised projects from Rijen will visit the local warehouse (hub), be consolidated with local stored material and shipped to site as soon as possible. All material will enter the location at the same time.

The LCs will concentrate on their core activities: selling, order-specification, installation and service. They will no longer be a part of the material-flow for customised projects.

The previous stage was concerned with the simplification of the basic structure. The control structure is the main-subject in stage two. Figure 4.3 shows the global structure while figure 4.4 visualises the order and supply process. The stocks at the local hubs do not contain projects but

local sourced material, additional features and service material. Appendix 4 contains a more detailed model of the logistic structure.

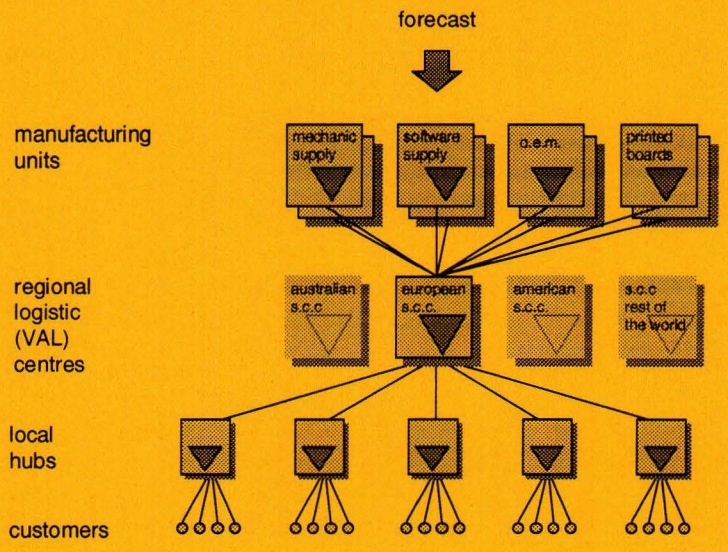


figure 4.3 Goods-flow stage 2

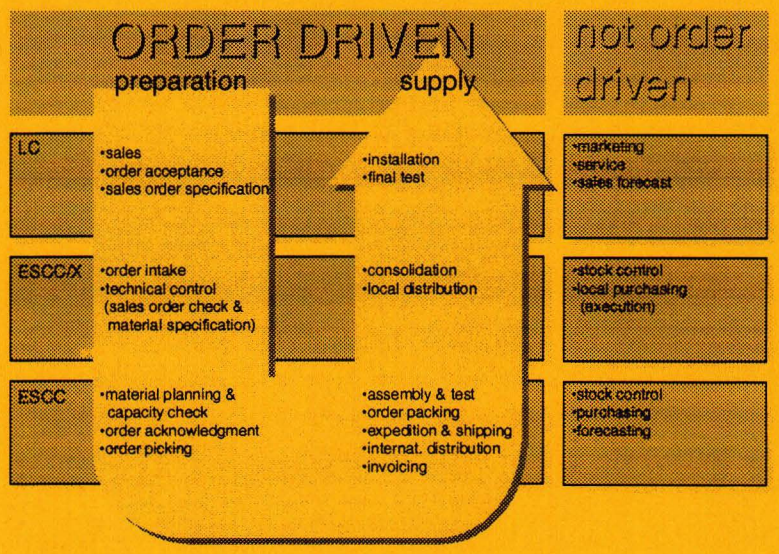


figure 4.4 Division of activities in stage 2

4.5 Overview of the changes

The next figure (4.5) shows the changes in the logistic concept between 1990 and 1995. The activities are combined in four procedures:

I Strategic/tactical;
II Operational: forecast driven;
Operational: order-driven:
III a: Order specification;
III b: Sourcing.

Changes are described in appendix 5.

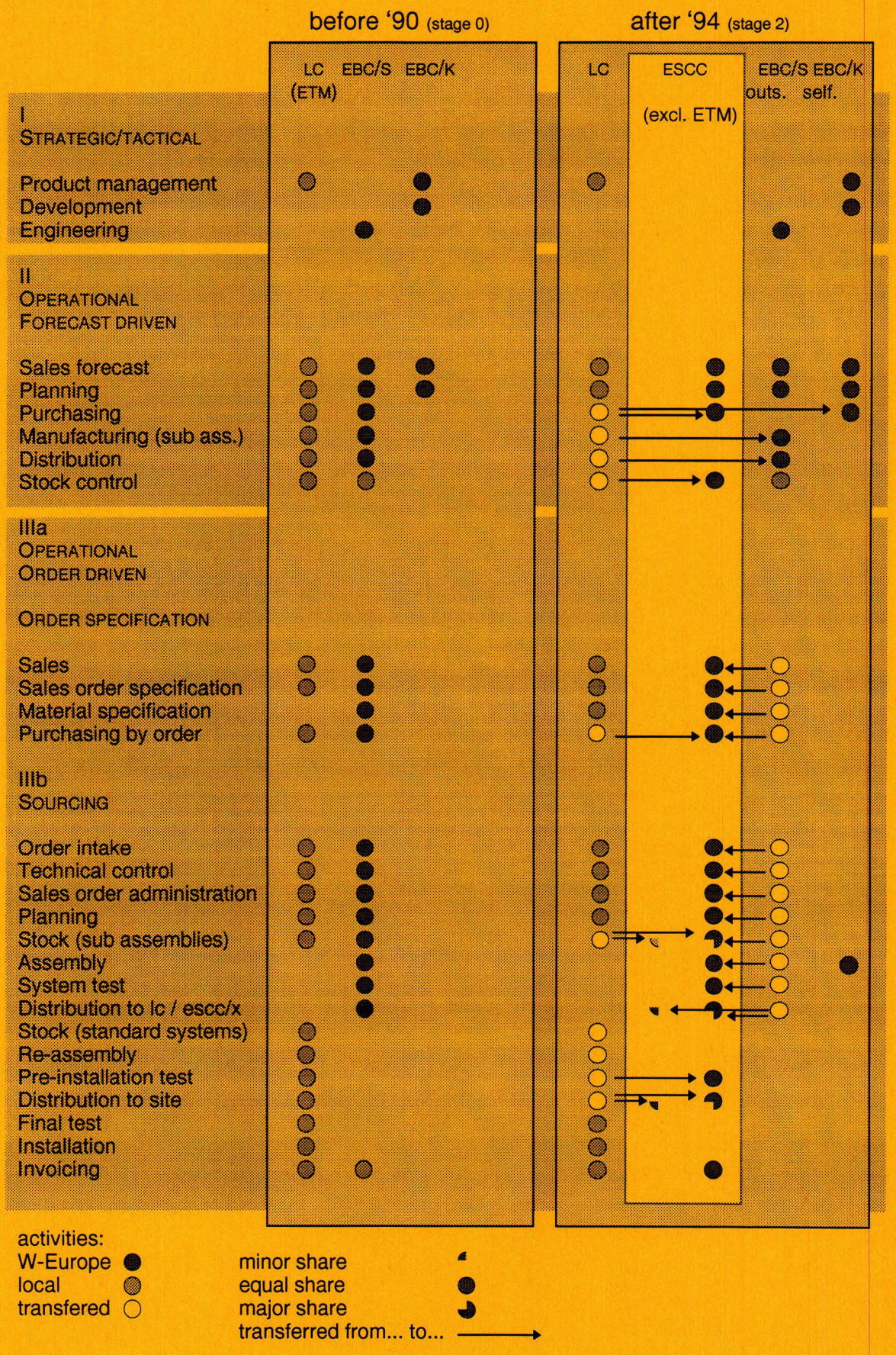


figure 4.5: Changes in the logistic concept between 1990 and 1995

chapter 5

RLC-CONCEPT AT ESPANIA COMUMICACIONES DE EMPRESA (ECE)

5.1 Introduction

The objective of implementing the RLC-concept in Spain is to reduce costs and to increase the performances by simplification of the logistic structure. Specified objectives are:

- shorten the lead-time for MD110-projects to 19 working days (from customer order intake at ECE till installation);
- shorten the lead-time to 2 working days for add-on material;
- delivery precision of 96% from ESCC and ECE;
- eliminate missing material problems.

The introduction of the concept has to be finished as soon as possible because it takes away the uncertainty experienced by the employees and because the sooner the possible advantages of the concept can be explored. The big disadvantage of a rushed implementation is the possibility that not everything is taken into account. This kind of problems occurred during the implementation of the RLC-concept in Germany and the United Kingdom. The negative results are still perceptible.

5.2 Approach

The approach which is described by Hoekstra and Romme [4] to design logistic structures is used in this project the evaluate Ericsson's RLC-concept. Some small adaptations to the model have been made to adjust it to the project's requirements (figure 5.1).

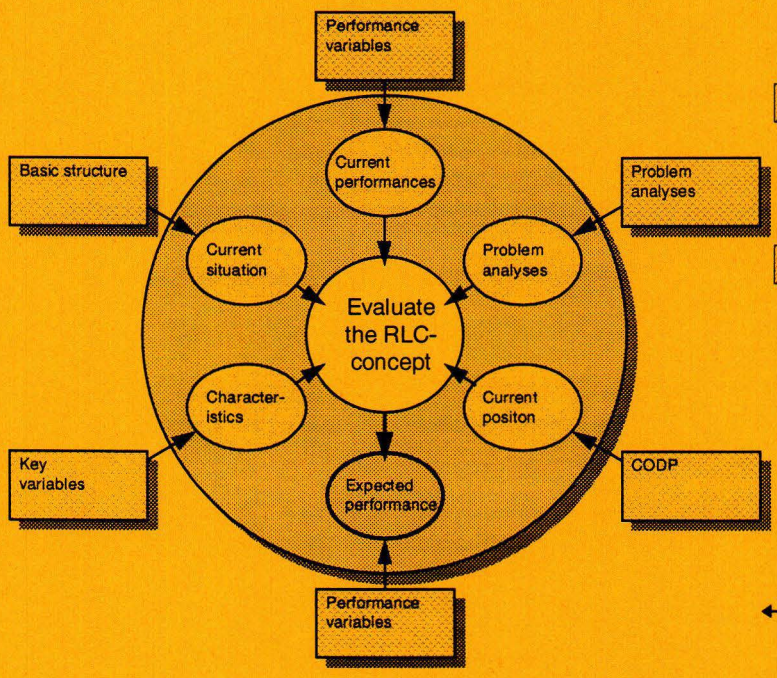


figure 5.1: Approach

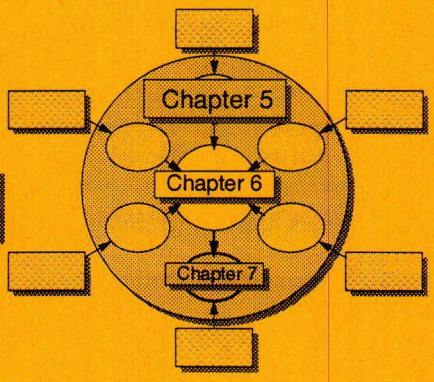
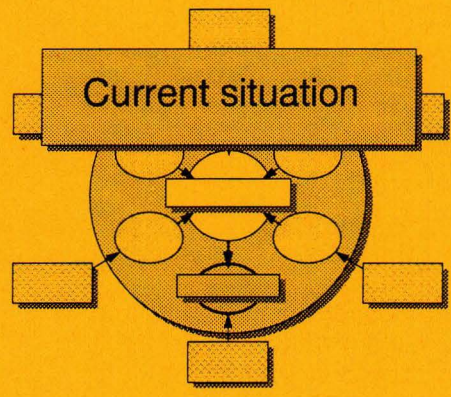


figure 5.2: Remaining chapters

The RLC-concept is already implemented in several other countries. A blue-print is therefor already known. The description of the RLC-concept and the theory took place in respectively chapters four and three. The objective of the integral approach is to investigate if the RLC-concept has rights to exist in a Spanish environment without forgetting any important issue.

The project is devided in three parts, each described in one of the remaining chapters (figure 5.2). The process starts with the description of the current situation, concerning among other things Ericsson's basic structure and key variables. The objective of this stage is to decide if VAL is feasible in these circumstances. The next stage, described in chapter 6, is a theoretical evaluation of the RLC-concept. The RLC-concept is compared with accepted design rules. The last part of the case is the estimation of the performances, changed by the introduction of VAL in Spain. Evaluation will take place in the last chapter of this report.

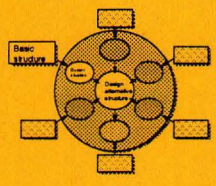
5.3 The current situation



The objective of this chapter is to investigate if VAL is feasible for ECE's situation. To answer this question five points of attention will be investigated.

5.3.1 Basic structure

Mentioned in the basic structure is the logistic goods-flow containing:



- the primary process;
- stock locations;
- goods-flows;

The objective of describing the current structure is to find out where complex situations can be simplified. Important in the change-process is to consider that structural trade-offs made while designing the structure is dictating operational trade-offs concerning the control of the goods-flow. Hoekstra and Romme [4] describe three points of attention to improve the logistic performance:

- simplify the structure;
- reduce the stock volume by moving the Client Order Decoupling point (CODP) upstream;
- increase the reaction speed by reducing the number of interfaces and decentralisation of logistic functions.

These recommendations will be used in the next chapter.
Ericsson's basic structure is shown in figure 5.3. The *primary process* is determined by two CODPs. The *stocks* are *located* at the ESCC and at different locations in Spain. The main store in Spain is located in Léganes, near Madrid and contains everything that is needed for the supply of orders (sub-assemblies, local sourced material and logistic packages). Six branch-offices spread over the country are responsible for the delivery of service related material. Ericsson Distribution European Network (EDEN) takes care of the *transport of the goods* between ESCC and ECE. The store at Léganes is used as a hub, from where the projects are transported to site. Before shipment to site the projects have to be customised, or at least consolidation has to take place with local stored material. The material-flow is disturbed because of these extra activities.

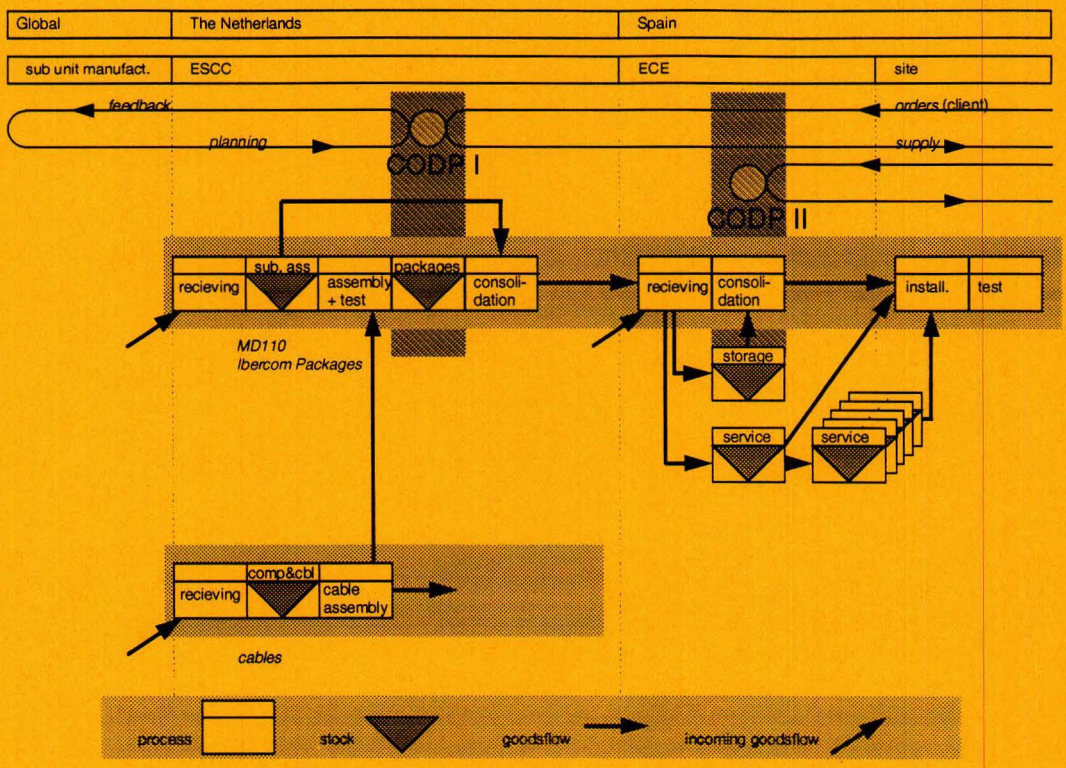
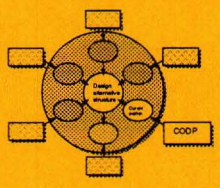


figure 5.3: Basic structure including CODP

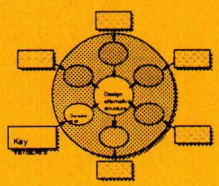
5.3.2 Client Order Decoupling Point (CODP)



The assembly of the logistic packages (appendix 1) at the ESCC is forecast-driven. The consolidation of projects containing logistic packages and aggregates is the first order-driven activity. The CODP (appendix 6) is situated at the stock containing the aggregates and packages (figure 5.3). In the picture both stocks are separated to make clear that there is an immediate activity, assembly. The fact that all packages are dedicated to the Spanish market does not make any difference. The aggregates assembled in the logistic package are no longer available for orders from other countries. Therefor you could see assembly of logistic packages as being order-driven not because the end-user is known, but the destination is. Assembly of logistic packages is not considered as being order-driven because these products are standardised (5 different packages) and because ECE (the client) is not the end-user.

There are also packages stored at ECE downstream the CODP (logistic packages stock at the ESCC). This implies that there is a second informal CODP, knowing that standard projects are not delivered to customers. ECE customises projects by adding local stored material. There is no reason to keep these packages on stock when the performance of the ESCC is confirm the latest agreements. The flow downstream the local stock is fully order-driven.

5.3.3 Key variables



The organisation, the logistic structure in particular, has to be adapted to the circumstances, in this section described by the so called key variables. In this paragraph only the most important variables are superficially discussed. All investigated variables are described in appendix 7.

5.3.3.1 Product characteristics

Lifecylcle length
The influence of the lifecycle-time is described in paragraph 3.2.2. It is obvious that the costs have to be paid back before the lifecycle-time is expired. The lifecycle length of a MD110-release consist of four stages:

- introduction of a new release;
- the release becomes the new standard;
- introduction of the next release;
- service obligations.

Approximately each two years a new release is introduced. The lifecycle length is longer, especially due to the reason that Ericsson supplies service material up to eight years after the next release is introduced.

Also the number of obsolete products depend on the life-cycle length. The MD110-release has a shorter life-cycle than most of its sub-assemblies. By assembly on order the risk for obsolescence reduces. The condition for assembly on order is that the time-to-market is short and accurate.

Variety / assortment
The MD110 assortment is almost infinitely, making assembly of final-products on forecast impossible. The assortment is wide because the end-user can choose out of many options.

Ibercom packages
Specific for the Spanish market is the use of standardised packages (LIMs). These LIMs are assembled on forecast. This makes standardisation necessary. The reason to introduce these modular LIMs in the past was reducing the time-to-market by delivery from stock. The customer can choose out of 32 different packages. To supply a project according the end-user requirements add-on material is added, (infinite assortment). ESCC only keeps 5 packages on stock. These LIMs are called Logistic packages. The 27 remaining packages are easily to complete by adding a few items to one of the Logistic packages.

Value density (fl./m^3) and volume density (#/m^3)
Value density is the value per m^3 while volume density (#/m^3) stands for the number of items per m^3. The values of the density characteristics determine what the major costs will be. Important physical distribution related costs are:

- transport;
- handling (physically as well as administrative);
- storage;
- interest.

The interest costs are determined by the value of the product. Handling expenses are dependant by the number of items to be handled, the volume density of the products. Figure 5.4 shows which costs are substantial for the different categories of products (based upon Goor, A.R. van, e.o. [16]).

Additional items (items to complete projects, service material and options) as well as LIMs have a high value density. The volume density is low, especially for LIMs. The variations for additional material is much larger because this assortments is very differentiated (bolts and nuts till boards and PCs). For LIMs it is clear that *interest costs* are dominant. Therefor it is recommendable to keep LIMs (Ibercom packages) out of stock. For additional material the *handling costs* relatively high. Ericsson's handling costs, administrative as well as physically, are substantial because 90% of all orders affects additional material. *Transport* from ESCC to ECE is organised by EDEN. The tariffs are determined by weight, volume has no influence.

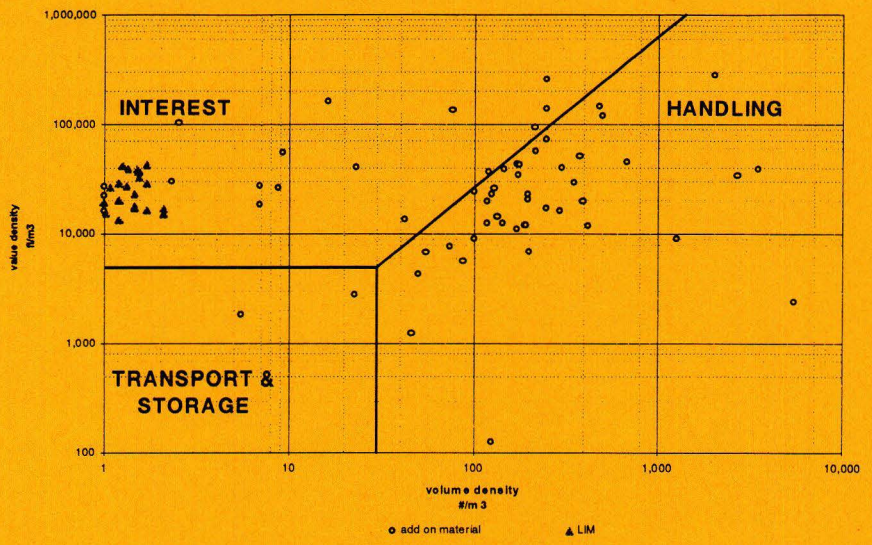


figure 5.4: Division of products based upon cost criteria

5.3.3.2 Market characteristics

Sales MD110

The MD110 is by far the most important product for ECE (figure 5.5) and the ESCC. Therefor this product is chosen as pilot. The Ibercom Packages are responsible for a major share of the MD110-sales (figure 5.6 and appendix 8).

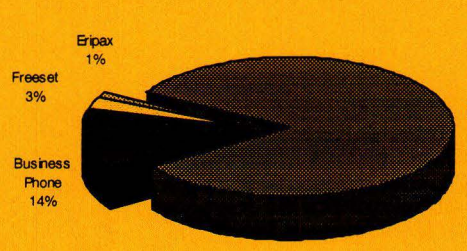


figure 5.5: Importance of ECE's MD110 sales) (turnover)

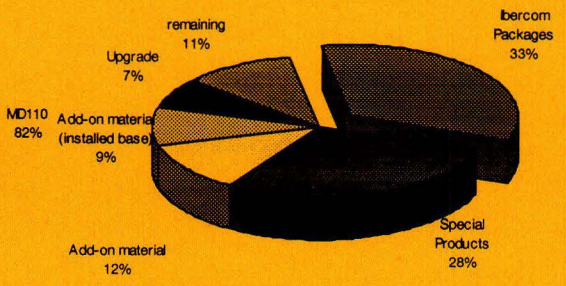


figure 5.6: Subdivision of ECE's MD110 sales (turnover)

Demand pattern

Knowing the expected demand pattern is very valuable information. The possible present season indices describe variations according a pattern and are necessary for estimation purposes. The needed safety stock levels and required flexibility can be reduced when variances in the demand are known.

The sales in Spain is growing (yearly growth 5%). The variance during the year is significant (figure 5.7 and 5.8). Sophisticated time-series techniques like exponential moving average can not be used due to the small number of observations, therefor the average is stroked to give an impression (line in both figures). The figures do not show a clear seasonal index. Comparing both figures shows something different: the average LIM contains less Lines than in the past. This phenomenon can carefully be explained. Technical revolution in the telecommunication industry makes end-users become reserved because the installed products become earlier dated. The customers are aware of the fact that the systems do not "last" as long as they did. Therefor the purchased capacity is based upon the short term need which is probably less than the capacity needed in the long run.

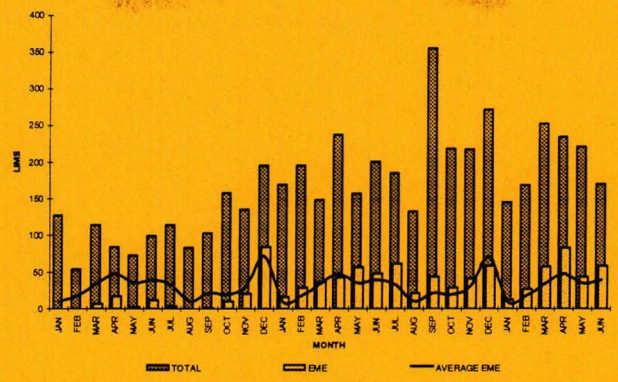


figure 5.7: Shipments from ESCC (LIMs) to ECE (EME) vs. total shipments from ESCC (Jan. '93 - Jun. '95)

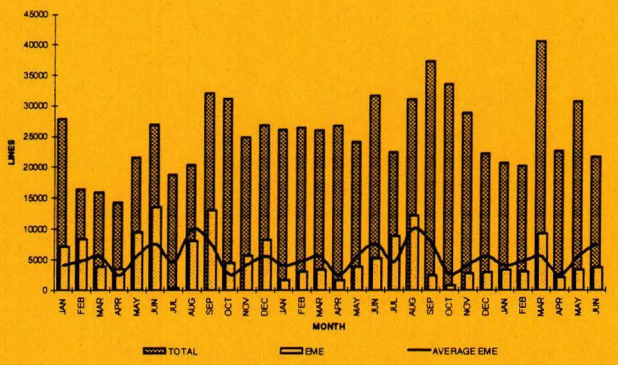


figure 5.8: Shipments from ESCC (Lines) to ECE (EME) vs. total shipments from ESCC (an. '93 - Jun. '95)

Correlation between sales-volumes

Stock levels are determined by the safety stock. The safety stock depends on the uncertainty in sales. The sum of the variances in the outlets is bigger than the total variance of the supplying unit when the correlation is low. Low correlation between the sales in different countries means that there is no positive relation between the sales. Centralising storage will level the sales fluctuations, leading to lower overall stock-levels.

The correlation between sales of different local companies as well as the sales of different Ibercom packages are investigated

The inquiry has the objective to answer two questions:

- does centralisation of stocks lead to reduction of stock-levels;
- does cancellation of production of logistic packages lead to lower stocks.

The correlation (tables A7.1 and A7.2 in appendix 7) between the sales in different countries is especially low for the most important ones. Thus centralisation will probably lead to lower overall stock-levels.

When there will no longer be packages on stock, extra aggregates have to be available to secure the supply to Spain. The correlation between the logistic packages determines the possible reductions. The correlation between the logistic packages is high (appendix 9). This means that the number of stored aggregates at the safety stock has to be increased. The advantage is that these aggregates also become available for other countries. In that case the withdrawal of the packages on stock will lead to significant reductions because the correlation between sales per country are low.

Time-to-market

The required lead-times for small installations are nowhere as short as in Spain (appendix 10). One of the reasons is that LIMs are also rented. The end-users require flexibility including short delivery times. 53% Of ESCC's project orders with a requested delivery-time of 2 weeks and 82% of the orders with a time-to-market of 3 weeks was ordered by ECE.

Price reduction
Prices used to be high. Sales prices have been reduced to 64% of the level of '93 due to potential competition.

Service
Service is Ericsson's Unique Selling Point. The competition (Siemens) offers technically more advanced LIMs at a lower price (20% less). Télefonica only sells Ericsson PABXs because they can only offer the service the market is asking for. The knowledge will improve even more by centralisation of activities.

legal affairs
Integration of international processes is disturbed by differences between regulations in the countries within Europe. The borders might have been opened, Europe is still not one homogeneous legal area.

5.3.3.3 Process characteristics

Ibercom Packages
The use of the Ibercom Packages determines the current process. The Logistic Packages are stored at the ESCC as well as at ECE. Much of the customising takes place in Spain. The disadvantages are clear:
- double stock, because ECE as well as ESCC have logistic packages and additional material for customising on stock;
- (re-) assembly, many projects have to be customised in Spain;
- quality problems, ECE has not the test equipment, time and expertise that is available at the ESCC;
- unrecognisable packages because the received project is one of the logistic packages plus additional material and not the Ibercom package that is ordered.

Centralisation of customising can reduce these problems to an acceptable minimum.

Primary production
Because the CODP at the ESCC is placed after the assembly of the logistic packages, the primary production activities (forecast driven) are:
- production of sub-assemblies;
- assembly of logistic packages.

Secondary production
The order-driven secondary production contains:
- consolidation at ESCC;
- distribution;
- consolidation at ECE;
- installation / customising / re-assembly.

The secondary production lead-time is important because it is together with order-intake and specification responsible for the time-to-market. The current lead-time is long because time that is used for installation also includes re-assembly. The time spend in Spain is also extra increased by the lack of material due to incomplete deliveries.

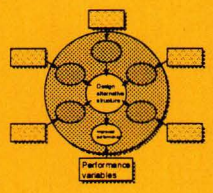
Explosion of the number of variants
An order supplied by ESCC contains:
- Logistic Package;
- Additional material (to complete the asked Ibercom package);
- Additional material (to customise).

The number of logistic and Ibercom packages are relative low (5 and 32). The explosion of variants takes place by consolidation of material which makes the project unique.

Local sourcing in Spain
Five percent (value) of all material is locally sourced. ECE's wish is to reduce local sourcing as much as possible. In the new concept it has to be controlled by ESCC. The only two reasons to maintain local supply are:

- local material is cheaper;
- there are no substitutes for the locally sourced material.

Import duties are not important because Spain as well as the Netherlands are both part of the European Union.



5.3.4 Performances & costs

The performances are measured to check if the objectives are reached and to detect possible problems. Van Goor and Ploos van Amstel[16] describe that there are four levels of performance measures in logistic environments (appendix 11). In this section is chosen for the highest aggregate level of measurement. The internal processes of the links in the value chain, such as ECE and ESCC, are conceived as being black boxes. Table 5.1 shows which performances are investigated in this section.

Category	Objective	Measurement
Performances		
	Product availability	Completeness of the order Correct number of order lines Right number of items per order lines
	Lead-time of the order	Lead-time Delivery reliability
	Flexibility	Rush orders Changes of customer's orders
Costs		
	Capital	Stock-level Work In Process Goods in transit
	Operational	Personnel Transport
	Remaining	Obsolescence costs Import duties

table 5.1: Investigated performances and costs

5.3.4.1 Performances

Product availability
No differences have been made between measuring of *completeness of the order, correct number of order lines* or *right number of items per order lines* (figures 5.9 till 5.11).

Figure 5.9 shows the percentage of incomplete / incorrect MD110 orders. Clear are the improvements that are made since 1991. The improvements took place due to two major changes:

- centralisation of production from EME (former ECE) to ESCC (1992);
- introduction of Logistic packages on stock (1993).

In spite of the improvements that are made in the past, the current objective is not reached (horizontal line).

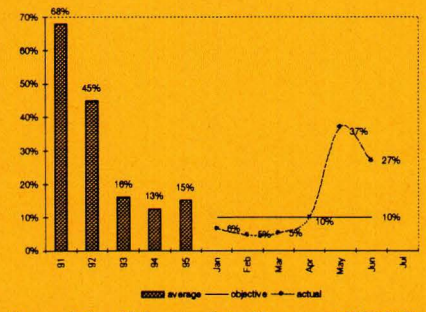


figure 5.9: % incomplete / incorrect MD110 orders

The incomplete deliveries in May and June are caused by ESCC's delivery problems which are a result of ESCC's suppliers' bad performances and insufficient safety stock. Another important reason is the fact that the introduction of the latest release has been delayed. So the need for "old" material was much more than planned, leading to supply problems. The aftermath of lack of material in spring 1995 are perceptible in all concerning measurements in this paragraph.

The current situation is closer investigated (figures 5.10 and 5.11). Discrimination between Ibercom packages and Add-on material shows that the performance of the last category is twice as bad. Reasons for the different performances are:

- projects are considered as being more important and get more attention;
- there is nobody at the ESCC responsible for the add-on material only;
- the demand of Logistic packages is more stable than add-on material;
- add-on materials depend more on the supply characteristics of the supplier (EBC) because the time-to-market is shorter (objectives in figures 5.11 and 5.12).
- the number of different Ibercom packages is much less than the number of add-ons, and therefor easier to forecast and to control.

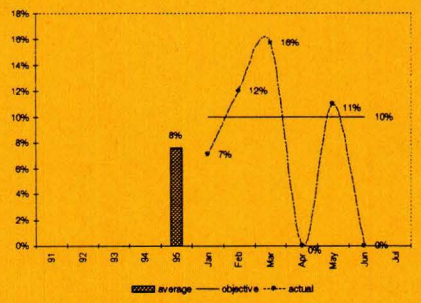


figure 5.10: % incomplete / incorrect Ibercom packages orders

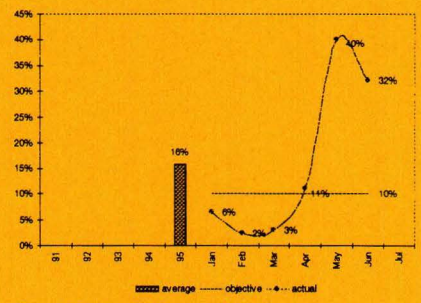


figure 5.11: % incomplete / incorrect add-on material orders

Lead-time of the order and delivery reliability

The time-to-market is an important selling point. This seems to be strange because the need for a communication system does not arise spontaneously. The negotiation and specification do take months. When the customer made his choice, he wants it as soon as possible. The lead-time is perceived as a quality characteristic. Poor specification in earlier stages can even reduce the time that is left for the delivery process. Repetition of specification is not rare.

If not mentioned, lead-times in this chapter will be expressed by calendar days. The approximate total lead-time for Ibercom packages, from order intake at ECE through installation on site is 45 days (December 1994, table 5.2).

Activity	Lead-time *(in calendar days)*	Responsibility
negotiations	months	Telefonica
order intake	12	ECE
sourcing	**21** (logistic package not in store) **10** (logistic package in store)	ESCC
transport	**5**	EDEN
consolidation	**4**	ECE
local transport	1-3	ECE
installation	3	ECE

table 5.2: Lead-times (inquiry December 1994)

The total lead-time of the bold printed activities in table 5.2 shows significant improvements where the product availability has been consolidated (figure 5.12). The figure describes the lead-time from picking at the ESCC till local transport. Improvements of the lead-time of Ibercom packages are realised by:

- improved communication;
- the introduction of Logistic packages (1993);
- improved forecasts.

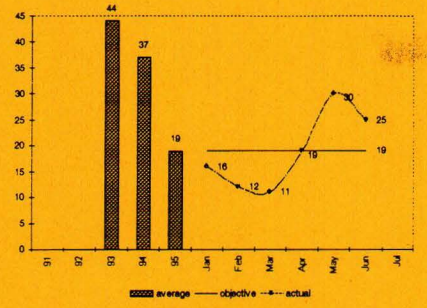


figure 5.12: Lead-time Ibercom packages

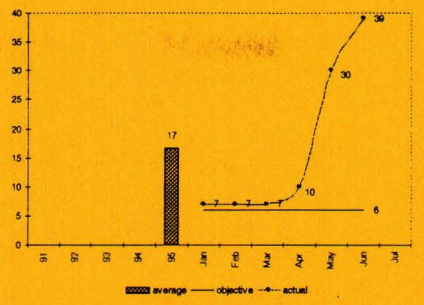


figure 5.13: Lead-time add-on material

The most important improvements are expected by reduction of the time spent on order intake and consolidation.

Delivery reliability is an important characteristic because the installation activities have to be prepared thoroughly. Any change due to delays mixes up the planning and affects the perception of the customer. Figure 5.14 shows the developments.

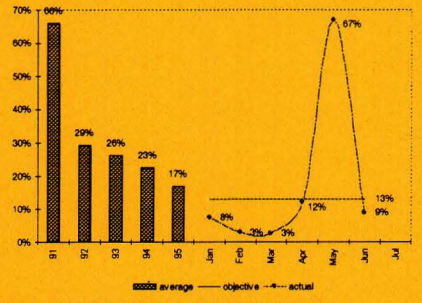


figure 5.14: % delayed MD110 orders

Flexibility

ECE is known for its short requested lead-times and *Rush orders*. Rush orders regarding projects are defined as orders which difference between requested date (date of delivery at the local company or hub) and order date is less than two weeks. Figures 5.15 and 5.16 show the requested delivery-times of MD110-projects by all local companies served by the ESCC, expressed in number of weeks (appendix 10).

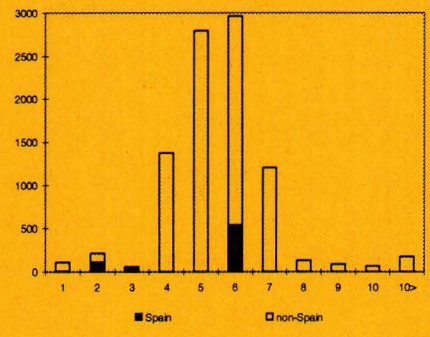


figure 5.15: Requested delivery-time in weeks (project order lines in March '95) (Spain and non-Spain)

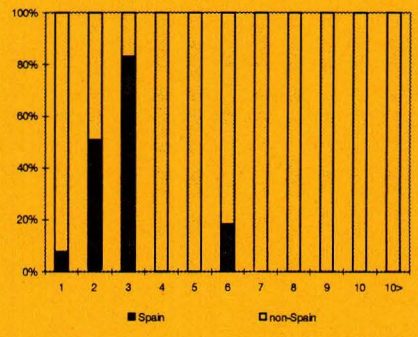


figure 5.16: Requested delivery-time in weeks (percentage, in March '95) (Spain and non-Spain)

4% (333) Of the total number of order lines in March 1995 are rush orders. One third was ordered by ECE, much more than any other local company (figure 5.16).

The second element of the *flexibility* measurement is the number of *changes of customer's orders.* During the process-time only 3% of the number of Ibercom projects has been changed.

Conclusions

- product availability has been improved a lot and is now consolidated but not satisfying yet;
- the delivery of logistic packages plus additional material from ESCC to ECE leads to misunderstandings, recognising related problems and a not satisfying product availability;
- the lead-times are still reducing due to a more demanding market;
- negotiation and specification take too much time, leading to unnecessary short delivery-times;
- ECE offers very short delivery times;
- the overall performances of additional material is much less than the projects because:
    - projects do have a longer objected delivery-time, while the time spend on customising is less than the difference in time;
    - packages are easier to control because the number different kinds is much less;
    - the number of expected projects is known before ordering takes place;
    - demand of projects is more stable;
    - nobody is responsible for only add-on material, but always also for projects;
    - projects are considered as being more important;
    - projects get more attention;
- the performances are very susceptible to disturbanced deliveries by ESCC's suppliers;
- delayed introduction of new releases causes huge problems due to the long delivery times of ESCC's suppliers;
- ESCC is not always capable in decoupling the problems at the primary production from the order-driven secondary production flow;

5.3.4.2 Costs

The figures used in this paragraph come from sources* of 1994 and the first half of 1995. Costs are considered as being results of other performances and therefor mentioned in this paragraph.

turnover & added value

The Spanish turnover of MD110-related products in the first half of 1995 was 25 .3 million NLG. The added value is shown in table 5.3. Obvious is that personnel costs are dominant (table 5.4). ECE's added value is more than ESCC's. This seems to be strange because ESCC's objective is to add value as being a Value Added Logistics centre. The difference can be explained by:

- ECE's costs not only include logistics;
- Installation and customising in Spain is expensive
- Interest costs are very high due to poor balancing between inbound and outbound and many accounts that are still receivable.

	ESCC			ECE		
costs x 1,000.- NLG	total ESCC	MD110	ECE related	total ECE	MD110	
personnel (logistic)	4,650	3,100	620		2,650	
transport	850	425	85	80	75 490	inbound (EDEN) outbound
import duties	125	125	25			
obsolescence	140	140	28		75	
interest	105 525	60 375	12 76	 550	165 110 80	WIP stock goods-in-transit
remaining	2,705	2,225	445		4,505	
total	9,200	6,450	1,290		8,150	

table 5.3: Added value (1st half of 1995)

*sources:

(ETM expenses MD110 1994, sales report EDC/N June 1995, kostenvergelijkings overzicht 1994, Rafeal Faura: sales figures, Andrès Garcia: Estditica de almacenes comunicaciones de empresa enero - junio 1995, Felipe Aranda: Situacion almacenes, Situacion Bus, Eric Hoornick: Capital and cost reduction program MD110 1994).

Operational costs like assembly, testing, installation and distribution are high at ECE compared with the costs of control and support (table 5.4) . The reason is that ECE receives logistic packages instead of customised Ibercom packages which makes local assembly necessary. At the ESCC are assembly and distribution the places where most employees work but control, planning and support are emphatically present. This proves that VAL is more than only assembly and moving boxes.

Activity	ESCC	ECE
assembly/manufacturing	180	300
test	70	200
installation	0	1600
distribution/material handling	180	550
order control	80	430
planning & purchasing	60	70
support & management	50	100
total	620	2650

table 5.4: Costs of personnel (1st half of 1995)

The earlier conclusions concerning the value- and volume density are not demonstrated by the registered figures. Costs for Interest, handling and transport & storage for ECE and ESCC together are almost all alike. The conclusion that LIMs are less responsible for the handling costs than the shipment of additional material can not be proved by these figures but is obvious.

Transport costs at the ESCC are mainly inbound-related (80%) because ESCC delivers its products ex-works. The assumption that transport costs are relative unimportant compared with interest costs is not proved. Reasons for the situation at ECE are:

- long distances;
- poor material availability leads to extra visits.

Import duties have been reduced to 125,000 NLG (total 1994: 770,000) in 1995 because Sweden joined the European Union (EU). Deliveries between EU-members are duty free.

Registered obsolete costs can be distorted. Costs only become visible when the stocks are checked. This activity is regular repeated at the ESCC. ECE's figure is an estimation of the value of material that not has been used for eight months. ECE does not regularly check its storage for obsolete products. This might be the reason for this high figure.

Fixed investments-related interest is low and therefor not registered in this table. Assembly and control-related activities (VAL) do not need high investments in expensive machinery.

WIP is at the ESCC much less than at ECE due to the fact that customising and testing at the ESCC is a smoothly, well organised flow (when material is available). This is confirms the expectations. WIP is determined by the lead-times. These are short because the production is split into two, and only the secondary production uses allocated material. Interest costs for material on stock are higher for ECE than for ESCC. Registered interest costs at ECE are relative high due to the significant margin that is gained at the ESCC.

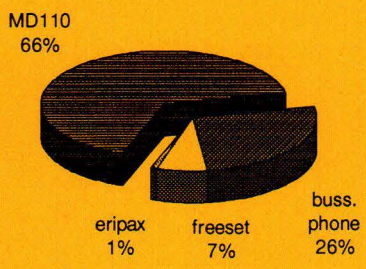


figure 5.18: Total amount of capital employed by ECE

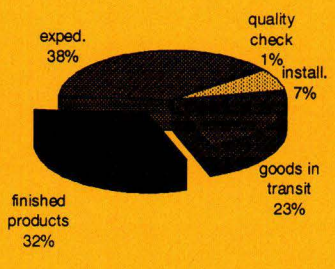


figure 5.19: Capital employed by MD110-related products

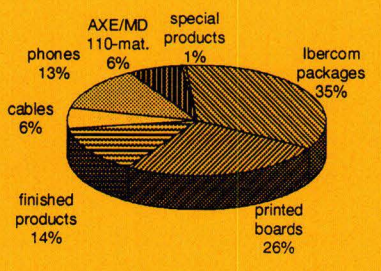
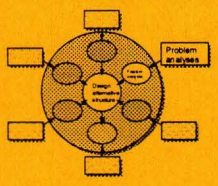


figure 5.20 : Capital employed by stock (finished products)

Figures 5.18 till 5.20 describe how the ECE's capital is employed by stocks, goods in transit and WIP. Most capital is employed by MD110-related products (ZPBM) It seems that there is a kind of economies of scale. Capital employed expands degressively as turnover increases. In contrast to the ESCC is the WIP much higher than the value of the stock. Not optimal tuning between inbound and outbound result in the high WIP level at the expedition department. The local stock is just a relative small buffer. Striking is the attendance of Ibercom packages at ECE because ESCC keeps them also especially dedicated for ECE on stock. Appendix 12 shows details.

5.3.5 Problem analysis



There are two different sources for the problem listing:

- interviews;
- discrepancy between measured performances, requirements and restrictions.

The division of problems takes place according the method as described in paragraph 2.4.

Inventory of problems	
symptom	inventory costs are too high product quality WIP at ECE is high
information & communication	incomplete deliveries
standards & procedures	large number of obsolescence products
qualified personnel	
logistic structure	time-to-market is too long delays
complete organisation	
environment	

table 5.4: Inventory of problems.

inventory costs are too high
At the moment there are several stocks in Spain and The Netherlands. Lack of integration leads to high inventories.

Local stocks have a relative high safety stock level because they can not profit from the low correlation between international sales. The stock is sizeable due to the wide assortment including Ibercom packages. These LIMs are responsible for 1/3 of the inventory's interest. Reduction of interest takes place when Ibercom packages are removed from stock. Instead the sub-assembly stock has to be expanded because the correlation between Ibercom packages is high. The secondary production has to accelerate to remain a short time-to-market . Extra sub-assemblies have to be stored to secure the supply. Sub-assemblies are modular and not only dedicated for the Spanish market. The correlation between sales is low so centralisation of stocks or integral stock control will reduce the stock levels significantly.

Measures to reduce the high stocks is to centralise the stocks or to integrate the stock control in combination with a shortened lead-time of the secondary production.

product quality
Serious problems occur in 3% of the installations. Customising on site by adding material to logistic packages can cause problems because the project has not been tested in its final configuration.

The impact of detected failures during decentralised tests is larger because the margin in time is reduced to a minimum. In case of centralised customising there will be substitutes available when there are technical problems detected, because the main storage is located at the same spot as the test location. Experience will increase by centralising tasks.

high WIP level at ECE
Goods in transit and Work in process are high. Especially the WIP at the expedition department is high. This interprets a poor co-ordination between inbound and outbound flows. Another possible

reason is that projects can not be delivered because the preparations on site have not been finished in-time.

Using the local stock as only a consolidation location for projects from Rijen and local stored material in combination with one integrated process instead of one local and one regional process will reduce the interest costs to a minimum.

incomplete and incorrect deliveries
No local company claims as often as ECE. This is partly justified because some claims are based upon mistakes due to poor communication.

Some causes for misunderstandings are:
- packages, ECE orders one of the 32 Ibercom Packages, ESCC delivers one of the 5 logistic packages plus additional material to assemble the delivered model according the to specifications. The delivered material is correct but it is not recognised as being the right package;
- information-system appliances at the Spanish receiving department are poor;
- partial shipments without an announcement are registered as an incomplete delivery.

A couple of misunderstandings can be solved by improved communication and coupling of the Dutch and Spanish information systems. Another possibility is to deliver only customised projects.

But of course many complaints are deservedly.
These have the same causes as the delays (see delays).

large number of obsolescence products at ECE
Short lifecycle lengths and the wide assortment can cause much obsolescence material and can not be influenced by organisational changes.

Local stocks have some major disadvantages. The correlation between sales in Europe is low. This means that in case of centralisation the fluctuations in sales are levelled. So a local storage has remain a relative high safety stock to secure the supply. The rate-of -circulation is low due to this high stock level. This increases the change that products become obsolete. Another reason to remove local stocks is the fact that it is material management is just an additional job at local companies. In VAL-centres like ESCC are people available who control the introduction of new releases. Local sourcing is no reason to remain a large stock because only five percent of the material (value) is locally sourced. Centralisation of stocks or integral stock control will reduce the costs of obsolescence.

time-to-market is too long
The requested lead-times are nowhere as short as in Spain. This market requirement can not be changed by Ericsson. Therefor the time-to-market has to be reduced from 45 days to 1 month.

Delivery of final products out of stock is not feasible because forecast driven final assembly is impossible due to the wide assortment. Final assembly on order remains the only possibility. Therefor the time-to-market has to be reduced by a shortened secondary production time and a faster order intake. To improve the secondary production the installation time has to be reduced by delivery of for instance final customised and tested projects. Time spent on order intake can be less when the processes at Telefonica, ECE and ESCC are integrated. This reduces time and personnel, while the change for misunderstandings declines.

Logistic packages and Ibercom packages on stock is no solution. Reduction of time by delivery of these products from stock is declined by local assembly, extra tests and a more installation efforts. Not only the difference in time is just marginal but also the costs are high. The transport-time between Rijen and Spain can eventually be reduced to two days and is therefor no objection for centralised customising. The second CODP for project at ECE becomes redundant.

Measures to improve the time-to-market are centralised customising (including tests) , integration of the order intake process and faster transport. Simplification and improvement of the MD110-design will also have positive influences in the future.

delays
Projects are not finished on time due to long installation and deliveries from ESCC that arrive too late.

Installation takes much time because some customising takes place on site. Also the tests on site take much time because the project never has been tested in the final configuration before. The impact of failures is large because material is not always immediately available and the margin in time that is left is minimal. That much time is spent on installation is subscribed by the costs of installation personnel, which are nowhere as high as in Spain. To reduce the number of delays it is important to deliver customised and tested projects on site. Therefor it is necessary to customise in an earlier stage.

Delayed deliveries from ESCC are not caused by the short requested delivery times, because these do hardly influence the performances (figures 5.21 & 5.22) . Delays are caused by lack of material. Lack of material is caused by insufficient safety stock levels and poor communication between ESCC and its suppliers. The stocks in spring 1995 were reduced because a new release was planned to be introduced. This introduction has been delayed and resulted in delivery problems. EBC is ESCC's main supplier and supplies also the other RLCs. EBC does not know which RLC needs the highest priority because there is no integral control.

Measures to reduce the number of delays can be customising in an early stage, so the impact of failures is less because more time is left. Centralised customising near the material storage preferable. Integration between ESCC and EBC might solve the lack of material problems which are the main cause for delays.

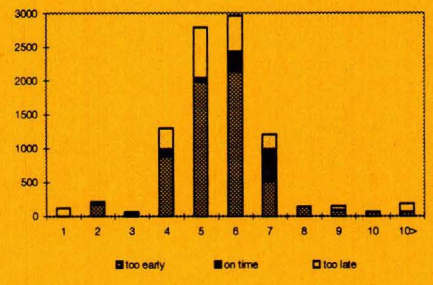


Figure 5.21: Delivery performance vs. lead-times in weeks (lines)

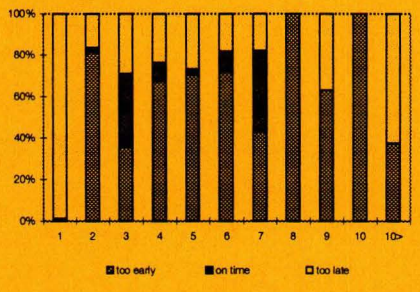


Figure 5.22: Delivery performance vs. lead-times in weeks (%)

5.3.5 Conclusions

Figure 2.1 shows that many problems are finally caused by the current logistic structure and organisation. These are the two highest aggregate levels which can be structured by Ericsson itself. The organisation and logistic structure are point of concern in the discussion if VAL is feasible in this situation.

The investigated product-, market- and process variables do not introduce insuperable restrictions for a concept like VAL.

The problems that occur in the current situation can be reduced by measures that have the characteristics of VAL and integrated control:

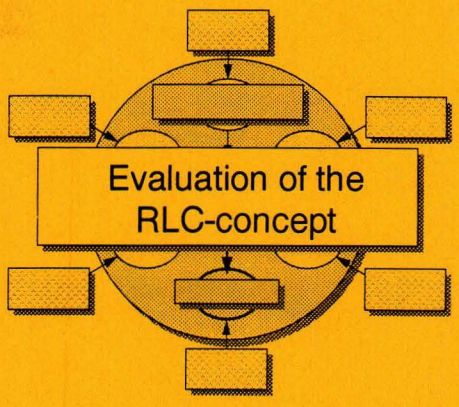
- reduced secondary production;
- central customising;
- central testing;
- integral stock control;
- centralised stock;
- integration of local and regional processes.

Concluding: VAL fits in the ECE's circumstances. If VAL offers benefits will be discussed in the next chapters.

chapter 6

RLC-CONCEPT

VERSUS THEORY



6.1 Introduction

The objective of this chapter is to investigate if the RLC-concept corresponds to design rules. The RLC-concept will be implemented in Spain to reduce costs and to increase the performances by simplification of the logistic structure. Simplification is important because it determines the controllability. Simplification is essential for the introduction of centralisation of logistics and integral co-ordination.

6.2 Judgement of the RLC-concept

These are the aspects that will be checked.

- Basic structure:
  - organisation borders;
  - stocks (location);
  - shared resources;
- Control structure:
  - Client Order Decoupling Point (CODP);
  - interfaces;
  - information infra-structure;
- Stock contents.

6.2.1 Basic structure

The basic structure describes the primary material flow containing:

- organisation borders;
- stock locations;
- shared resources.

The basic structure will dictate all coming aspects and that is why this is handled first. The advantage of the basic structure is that it shows directly when there is an unnecessary complex situation. Point of departure concerning simplification is: No organisation borders, stocks or shared resources unless their indispensability is proved.

Organisation border
This is the border between at least two independent operating units in the goods-flow with their own responsibilities, the flow is interrupted by storage or a transformation process.

The complexity of the basic structure is determined by the number of organisations that is involved. Integral control over organisation borders is impossible because each organisation has its own responsibility and independence. Clustering of organisations is an objective to increase the controllability.

The current situation is shown in figure 6.1. Three different borders are present. The current situation is analysed in appendix 13. The border between the LC and ESCC is redundant (figure 6.1) in a control point of view. Merger of both independent parties to one organisation increases the control capability (figure 6.2). The benefits of integral logistics becomes available (smoother

material-flows, improved stock control, etc.). The interruption of the flow is marginal. The shipment from ESCC to end-users is interrupted by consolidation at the subsidiary of the ESCC in the country of destination (ESCC/X). Because the consolidation will take less than a day this is not considered as being a interruption like mentioned in the concept description.

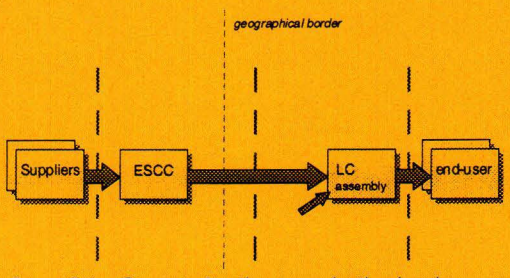


figure 6.1: Current situation organisation borders

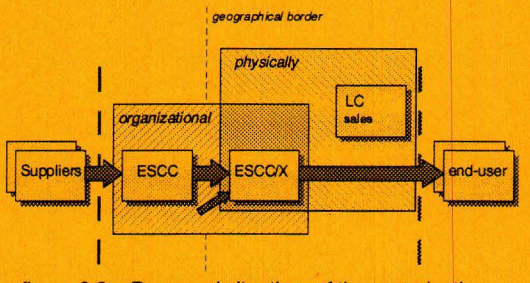


figure 6.2: Proposed situation of the organisation borders

Organisation borders that are left are:
- suppliers (including EBC) - ESCC(/X);
- ESCC(/X) - end-user.

These borders are necessary. Also the border between ESCC and supplying Ericsson companies (EBC) has to remain. This border is necessary to keep the forecast driven primary production and order driven separated. When this border should be removed, the contradictorily interests can be mixed up. Improved information transfer between ESCC and suppliers is advisable to adjust each others processes.

The RLC-concept is in accordance with accepted design rules because the number of organisation borders is minimised.

Stock location
This section only stocks located in warehouses with a logistic purpose are mentioned. WIP, strategic stocks and others are no point of concern. The disadvantages of stocks are clear:
- capital employed;
- operational costs (handling, storage capacity).

One of the objectives to simplify the basic structure is to decrease the number of stocks. A way to see if stocks are needed is to devide the contents of the stock into different functions. By changing the organisation, the functions may no longer be needed just like that particular part of the stock.

The basic structure shows the location of the stocks. The assortment of the stock is another question (paragraph 6.2.4). The level of the stocks (safety) is an operational issue.

The current situation is analysed in appendix 14. Centralisation of all customising activities is made possible by reduction of internal lead-times. Delivery of projects from stock is no longer necessary to reach the short requested time-to-market. All projects (Logistic packages) can be removed from stock. The number of local stored aggregates can be reduced because local customising will be stopped. An increasing centralised aggregate stock replaces the safety function of the Logistic packages on stock. The number of stocks will not become less because packages and aggregates are stored at the same location, so only the contents will be reduced, especially at ECE. The remaining stocks at EBC and ESCC are needed because these organisations can be considered as being shared resources. The local stock is needed for local sourced material and service purposes. It is not necessary to move the contents of the local stock to ESCC's storage when the both stocks are integrally co-ordinated.

The RLC-concept corresponds with the theory because the stocks in Rijen and Spain fulfil a necessary role.

Shared resources
Shared resources are units in the chain that are used by different divisions with their own product-/market strategy. Shared resources are functional (process) oriented to gain:

- economies of scale;
- levelling of capacities;
- synergy;
- the advantages of specialisation.

The disadvantages of shared resources are basically caused by the priority problems. Batch-sizes are present when the capacity can not be split. This leads to queues in front of the bottle-neck extended lead-times and decreasing delivery performances. Priority will also cause attention related problems.

A VAL-centre is a process oriented shared resource. It is supply-oriented. The priority problems will increase when the activities expand by an increasing number of product- /market combinations. Botter[2] advises a product oriented organisation when such problems occur. This internal specialisation will be formed as a matrix structure. Each product-market combination will be controlled by an 'independent' team. The increasing turnover makes a matrix-organisation affordable. This change in organisation structure is already taking place at the ESCC at this moment.

The advantages of the VAL-concept counterbalance the disadvantages characteristic for shared resources. Removal of the VAL-centre will not solve shared resources' problems:

- controllability: shared resources are hard to control and are often an extra link in the chain. Centralisation relieves the supplying and receiving parties while the VAL-centre has its economy of scale benefits. Most important contribution of VAL is the improvement of the controllability by simplification of the overall structure (figures 4.1 and 4.2) ;
- stocks: the supplying material-flows to shared resources have to be decoupled by stock. The total stock-level will however reduce because the stocks (control) are centralised (removal of double stocks);
- lead-time: the time-to-market does not increase but decrease because only the order-process and the secondary production determine the lead-time instead of the total primary process.

The conclusion is, that there are no superfluous shared resources because the benefits are much more important than the disadvantages. Negative influences of the shared resources can be decreased by introducing a product-focused organisation. These conclusions correspond with the RLC-concept.

Recap
The 3 discussed elements of the basic structure are mutually dependent. The proposed changes are modest and correspondingly to the RLC-concept. Proposed changes are:

- removal of the organisation border between ESCC and local companies (ECE);
- removal of Ibercom-related stocks (logistic packages);
- introducing a matrix organisation which is product oriented.

Cost-oriented companies become more performance (market) focused. The first step to adjust to the new market requirements is by simplifying the basic structure. The second stage is to adapt the control concept to the changed basic structure.

6.2.2 Control structure

The control structure has to be adapted to the basic structure. The next aspects of the control structure are discussed:

- client order decoupling point (CODP);
- interfaces;
- information infra-structure.

Client Order Decoupling Point
Hoekstra and Romme[4] describe a way to determine the optimal position of the CODP. This method is superfluous in this case because the current CODP, assembly on order is the only possibility. Alternative CODP positions like *production on order* would take too much time while

forecast driven assembly is impossible due too the large assortment. The method will however be used to determine the contents of stocks.

Assembly on order is the only CODP position that fits the VAL-concept [12] . The location should be the VAL-centre. The second CODP for projects at ECE is therefor misplaced. According to the theory there should be only one CODP. Every extra CODP increases the need for information and makes the structure more complicated than necessary. The reason that projects customised at ECE can be delivered faster is nonsense. The only difference between customising at ESCC or ECE (on site) is the transport time from The Netherlands to the local hub. This transport time can be reduced to two days and is therefor no obstacle. The proposed RLC-concept only contains one CODP for projects.

Interfaces
Each process flow between two organisations has to be controlled by interfaces. The number of interfaces is determined by the number of organisations that are involved. The simplification of the basic structure has reduced the required control efforts. We have seen that there only remain two kinds of organisation borders. One upstream the CODP, between the ESCC and its suppliers, another downstream, between ESCC's subsidiary ESCC/X and the customer.

The need for detailed structured interfaces depend on the level in the organisation. Strategic and tactical-oriented levels do not communicate as often and intense as the lower levels such as control and operations and therefor do not need detailed structured interfaces (figure 6.3).

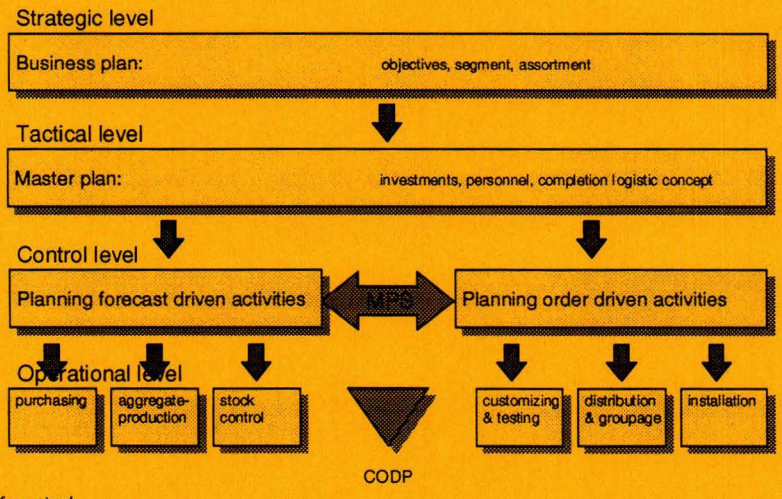


figure 6.3: Levels of control

The main issue for chain co-ordination is the control level, responsible for regulation of the production and supply process. There are three levels of integration of the control for VAL-oriented organisations for each interface:

- Business teams;
- Integral co-ordination;
- One organisation.

In the current situation there is an interface between ESCC and the Local Company (ECE). The level of integration is *Integral co-ordination*. The independent organisations are guided by exchange of information. The co-ordination is formed by a Master Production Schedule (MPS). This MPS is based upon expectations. The forecasts are supplied by the local companies because they know their markets best and co-operation stimulates the acceptance of the MPS. Ericsson's version of this *Integral co-ordination* is not profound. There is for instance no integral stock or goods-flow control. Local Companies have a high level of independence. The ESCC is considered as being a supplier not as being a part of the same organisation.

In the second stage of the RLC-concept ESCC and the order-process responsible part of ECE will be combined into *One organisation*. This means that the control and responsibility will be centralised. Essential is that there is just one captain on the ship, in this case ESCC. Because

ESCC's subsidiaries are often located at the same location as the Local Company, which will be concentrated on the sales and service function, and manned by former local employees, this is sometimes a problem.

The remaining border downstream is between Ericsson and Telefonica, the Spanish distributor. The level of co-ordination can be upgraded to *Business teams*. Both organisations stay independent of course but tuning of each others processes increases the overall performances. Integration is important from Ericsson's point of view because Telefonica is a still a monopolist. This first step into integration is also important because sales and the negotiation process both take too much time.

At the operational level, the activities upstream the CODP are pushed by forecast while the downstream processes are pulled by orders. MRPI is used by ESCC to control the assembly process of the projects. The proposed changes correspond with the RLC-concept.

Information infrastructure
Information supports the logistic process. It is actually one of the two most important flows: physical (material) and information. The information flow is subordinate to the material flow. Therefor the information transport time should be less than the concerning material flow. In Ericsson's case is reduction of the information flow important because it is responsible for half of the total lead-time.

The results are shown in appendix 15. The level of detail is not suitable to discuss this aspect in this part of the report. Processes have been split to remain a clear picture.

6.2.4 Stock contents

The stock control will be centralised because the level of integration increases to *One organisation*. The contents will be located at two places according to the basic structure. Hoekstra and Romme[4] describe a way to determine the optimal CODP location. This method can also be used to solve stock location related problems and is used in appendix 16. The requirements and restrictions determine the contents of the local store in Spain and centralised storage at the ESCC. Characteristics that are from any importance are mentioned in figure 6.4. Downstream corresponds to local storage, upstream with centralised in Rijen.

It is not possible to consider all products as being one homogeneous group. Therefor the assortment of the stocks have to be devised in homogeneous families based upon several variables concerning:

- product;
- market;
- process.

As described earlier the use of packages on stock are no longer justifiable. What remains are sub-assemblies and finished goods. Respectively used for assembly and as additional material like telephone sets.

Products that *have to* be stored in Spain are:

- products with a requested time-to-market (two days) which is less than the lead-time (this concerns especially service material and some add-on products).

Products that *have to* stored at the ESCC are:

- products that are needed for customised projects which have to be tested in their final configuration.

All remaining products can be stored at both stores. Where the products will be stored depend on costs. Because the correlation between international sales is low it is preferable to centralise as much as possible to reduce the overall stock levels. The benefits of a centralised stock can partly be reached by integral stock control.

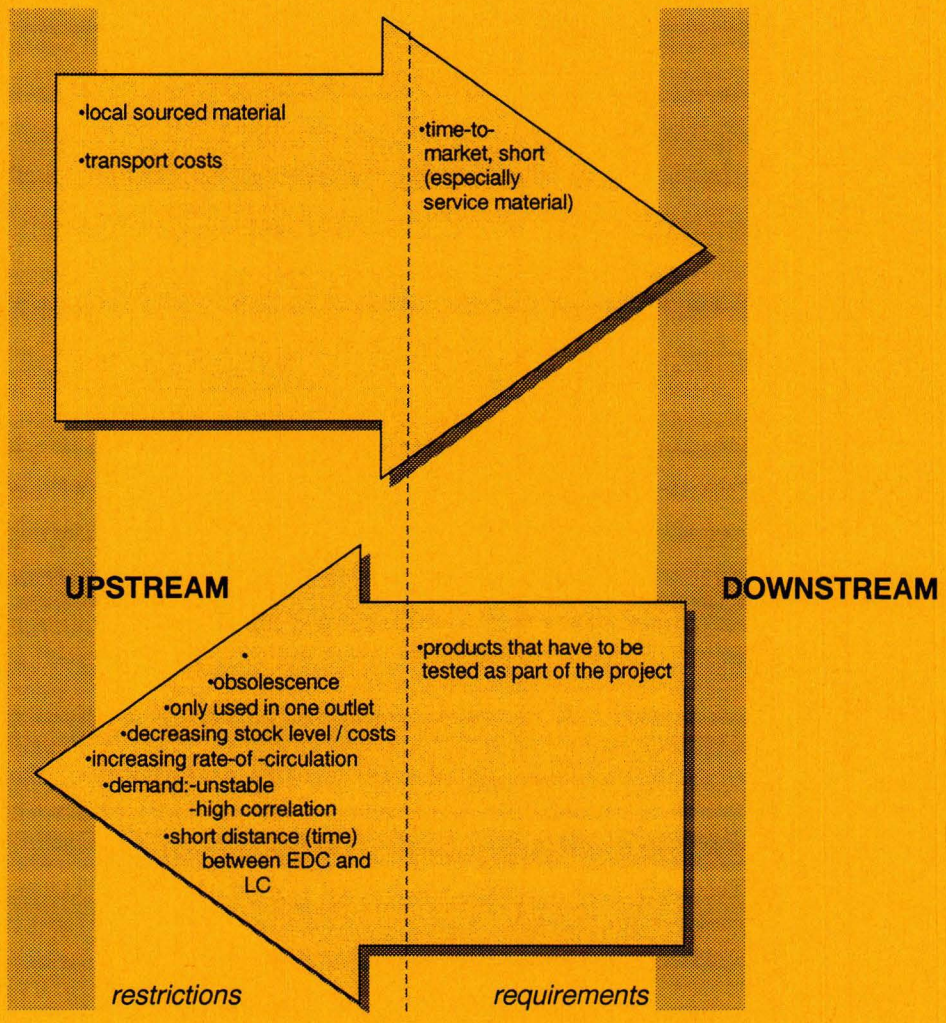


figure 6.4 Upstream and downstream forces

Some products can better be stored at the local stock:

- material that is only locally used (centralisation does not decrease the stocks);
- locally sourced material (costs of transport and handling might be more than costs of storage);
- fast movers (the costs for interest and obsolescence are low due to the high rate-of-circulation and might be less than the costs related to order control (supplies are order related and not forecast related in case of a centralised stock, therefor the number of orders and deliveries are multiplied)

6.3 Conclusion

The objective of this section was to figure out if Ericsson's VAL concept is considered based upon theory. The answer is yes, because there are not found any striking differences between the theory and the RLC-concept.

Basic structure

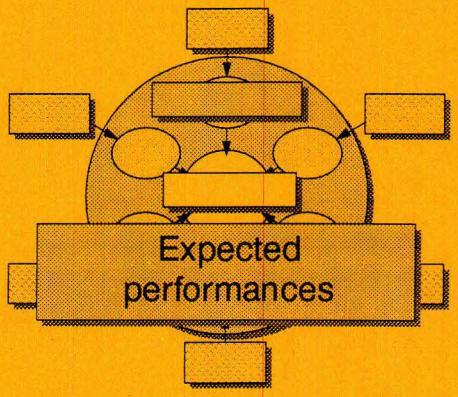
The objective is to simplify the basic structure to improve the controllability. The basic structure is in the RLC-concept simplified as much as possible. There are no superfluous organisation borders, stock-locations or shared resources. The biggest suggested change is the integration of the ESCC and the order-process related part of ECE into one organisation.

Control structure
The number of CODPs for projects has to be reduced to one. The current CODP at ECE is not necessary when the expected lead-times are realised. The benefits are decreased need for information, an uniform process flow at ECE as well as at the ESCC and removal of packages on stock.
The interfaces will be upgraded leading to an improved exchange of information and control of the primary process. Looking at other LCs it is questionable if these proposed levels of integration really work in practise. In some countries ESCC is still considered as being just a supplier instead of part of the process. Too often the parties are busy with their own objectives, losing the global objective out of sight. This problem is human-related and determines if the RLC-concept will succeed. From a logistic point of view the right decisions have been made. The next step is to convince the people who are involved that only way to create a win-win situation is to think global.

Stock contents
There will always be a local stock although the contents may be changed a lot. Introduction of the RLC-concept will reduce the contents of these stocks to a minimum when there is an integrated stock control.

chapter 7

EXPECTATIONS



7.1 Introduction

The objective of this chapter is to find out if the proposed RLC-concept offers significant benefits. Therefor the influence of the concept has to be estimated.

ESCC will take care of all logistic-related costs. For ECE are this savings. In this report movements of costs are not considered as being savings.

7.2 Delivery performances

Estimates according delivery performances will not be made because that is hardly possible. Instead the new objectives will be listed. These objectives are however no guarantee for the future because not all objectives have been reached in the past.

Lead-times

Activity	current (in calendar days)	carried out by	RLC concept (in working days)	carried out by
negotiations	months	Telefonica	months	Telefonica
order intake	12	ECE	3	ESCC/E
sourcing	21 (if not in store)	ESCC	10	ESCC
	10 (if in store)	ESCC		ESCC
transport	5	EDEN	2	forwarder
consolidation	4	ECE	1/2	forwarder
local transport	1-3	ECE	1/2	forwarder
installation	4	ECE	3	ECE
total (average)	45		19 (26 calendar days)	

table 7.1 Improved Lead-times

The differences between the objectives and performances of the current situation are big. This is because the current figures are based upon averages while the objectives are based upon best possible performances. Order intake can be reduced because in the current situation the orders are waiting most of the time. Some activities are done twice at ECE as well as at ESCC. Combining the activities at one place reduces the waiting times. Sourcing will be fully order driven and include customising. Transport and consolidation will be sourced out. Transport time can be reduced to two days. The time that projects are waiting for delivery to site reduces because the two flows of local stored material and ESCC's projects are adjusted to each other by centralised co-ordination. Installation efforts decrease due to the delivery of improved and tested material which is already customised.

Product availability

Product availability	current	RLC concept
ESCC	82%	96%
ECE (ESCC/E)	85%	96%

ESCC as well as ECE have to improve their performances. The current figures are negative influenced by delivery problems of some major suppliers and delayed introduction of new releases. ECE (ESCC/E) becomes fully dependant on the performances of ESCC because ESCC will control the process and the material.

7.3 Costs

The influence of the proposed RLC-concept is showed in table 7.2.

	ESCC			ECE			
costs x 1,000,- NLG	current situation	RLC-concept	difference	current situation	RLC-concept	difference	
personnel (logistic)	620	700	+80	2,650	2,500	-150	
transport	85	85	0	75 490	65 450	-10 -40	inbound outbound
import duties	25	25	0	0	0	0	
obsolescence	28	28	0	75	50	-25	
interest	12 75	9 80	-3 +5	165 110 80	20 35 25	-145 -75 -55	WIP stock goods-in-transit
remaining	445			4,505			
total	1,290		+82	8,150		-500	

table 7.2: Changes of costs caused by the introduction of the RLC-concept in Spain (concerning first half of 1995)

The total reduction which is based upon data from the first half of 1995 is just about 400.000 NLG per six months. A reduction of approximately 5% of the total added value. The RLC-concept has only significant influences on the logistic costs plus assembly which are mentioned in table 7.2. These costs are reduced by 10%. The changes are explained in the following text.

personnel

The costs of personnel are the largest by far. ECE expects to reduce the number of employees by 4 (Andres Garcia). In the long run this number might increase. At the ESCC 2 extra employees are needed. Overall reduction of the number of employees is possible because of:

- improved efficiency due to economies of scale;
- increasing know how due to centralisation;
- decreased need for communication;
- disappearance of double activities: re-assembly;
  order-intake;
  stock control;
  purchasing.

transport

All transport will be sourced out to one forwarder. Changes are:

- more customised projects are shipped from the ESCC instead of consolidated material;
- less local sourcing in Spain will increase the volume shipped form Rijen, this will hardly be recognisable because only 5% of the material is locally sourced;
- less local transport because all the material will be shipped at the same time to the site because the material flows come together in the local hub.

These changes will have just a small influence on the costs.

import duties

The assumption is that ECE hardly pays import duties because the material is bought on the local market. The list of suppliers does contain just a few minor companies that are established outside the EU. Reduction of the import duties at the ESCC will not be influenced by introduction of the RLC-concept at ECE. A major change has been of course the entry of Sweden to the EU.

obsolescence
There is no reason due to the introduction of the RLC-concept why the costs may decline at the ESCC. Reasons why obsolete costs might reduce at ECE are:

- lower stock-levels due to centralisation of the stock (-control);
- improved maintenance of the stock;
- less material locally sourced, due to centralisation of purchasing;

Centralisation of the customising activities and the removal of the packages on stock will not contribute to the savings. The rate-of-circulation of the logistic packages is high and therefor not responsible for the current obsolete costs.

interest
The margin at ESCC has a significant influence on the value related costs at ECE.

Work-In-Process
WIP is determined by capital that is employed and the lead-times. The value will not be changed. The lead-times (calendar days) however will.

Work in Process	current lead-time (in calendar days)	RLC concept (in calendar days)
ESCC (secondary prod.)	15	11
ECE (consolidation)*	5	1
ECE (installation)	5	3

*expedition and quality check

Checking ECE's costs showed that a lot of material is waiting for delivery at the expedition department (appendix 17). The savings are therefor not proportional the lead-time reductions. In the new situation the waiting material at expedition will be less because the in- and outgoing flows will be very strictly controlled. It is hard to say what it will be like when the RLC-concept is introduced. You might say that all waiting material will be removed. This causes a very important reduction of costs.

goods in transit
Costs for Goods in transit depend on value of the goods and the lead-times.

Goods in transit	current lead-time (in calendar days)	RLC concept (in calendar days)
ESCC-ECE(HUB)	6	2
ECE(HUB)-site	3	1

ESCC delivers ex-works to ECE. ECE is the one who pays for the goods in transit in the current situation. The value of material shipped from ESCC to ECE will increase because local souring will be reduced. The influence of this amount is however not significant.

7.4 Conclusions

The reductions of costs are modest (10%). Reduction of interest costs is the most significant. This reduction is possible due to centralisation, increased control and shorter lead-times.

The expected improvements of the delivery performances are much more promising. The time-to-market will almost be half of the lead-time of one year ago. The Product availability will increase to an acceptable level. Introduction of the RLC-concept is more important for the improvement of the delivery performance than for the reduction of costs. It seems that effectively is more improved by implementation of the RLC-concept than efficiency.

Improvement of the performances is more important than reduction of costs because service including a well organised supply of projects is one of Ericsson's Unique Selling Points. Especially on the Spanish market is a short accurate delivery of vital importance because Telefonica chooses suppliers who can provide a high level of service combined with a minimal lead-time.

If these promising performances really can be reached remains a question till implementation has taken place.

chapter 8

CONCLUSIONS & RECOMMENDATIONS

8.1 Introduction

The objective of this graduation research project is:

Indicate if Ericsson's latest logistic concept is feasible for the Spanish situation, based upon incurred effects of Value Added Logistics and justified by theory.

The conclusions have to give an answer. The project is focused on the Spanish situation. The conclusions and recommendations are aggregated when possible. To investigate if the RLC-concept is feasible three stages have been passed:

- inquiry of the circumstances, to find out if VAL is applicable (chapter 5);
- a comparison between RLC-concept and theory (chapter 6);
- calculating expectations (chapter 7).

8.2 Conclusions

Current situation

Investigation of the current circumstances has shown that VAL is feasible. The VAL-concept fits in the situation where ECE has to deal with. There is no product-, market- or process-characteristic that makes VAL impossible to implement. It is obvious that the current situation has to be changed to reach the increasing market requirements. Therefor the logistic structure has to be adapted because most problems are related to this structure. These problems can be reduced by measures that have the characteristics of VAL and integrated control.

RLC-concept versus theory

The comparison between Ericsson's RLC-concept and theory proves that this concept is theoretically justified. The VAL-concept is used by Ericsson to simplify the logistic structure. Reduction of the complexity increases the controllability leading to improved performances and reduction of costs. Simplification of the structure is necessary to make integral co-ordination possible. Stage two, of the RLC-concept is the first step into integral co-ordination. The biggest suggested change to reduce the complexity is the integration of the ESCC and the order-process related part of ECE into one organisation.

The remaining interfaces will be upgraded leading to an improved exchange of information and control of the primary process. Looking at other LCs it is questionable if these proposed levels of integration really work in practise. In some countries ESCC is still considered as being just a supplier instead of a partner in the process. Too often the parties are busy with their own objectives, losing the global objective out of sight. This problem determines if the RLC-concept will succeed. From a logistic point of view the right decisions have been made. The next step is to convince the people who are involved that only way to create a win-win situation is to think global.

Expectations of the performances

The quantitative expectations show that the logistic costs will be reduced by ten percent. Especially the interest costs will reduce by decreasing lead-times. Costs of personnel will be reduced due to centralisation of tasks. Much more important is the increasing delivery performances (availability and lead-times). The Spanish market is very demanding and the monopolist Telefonica only chooses suppliers who can deliver according extreme standards.

Therefor it is more important to improve the performances than to reduce the costs. The expected performances of an implemented RLC-concept are much better than the current performances. Reduction of costs is a matter of minor importance, the main issue is an improved delivery performance.

Recap
According to the investigation is the proposed RLC-concept feasible for the Spanish situation. There are however still aspects that have a negative influence on the developments and performances:

- Integration between ESCC and LCs has not been finished yet.
  Co-operation is the determining characteristic. Each party is still defending its own "kingdom".
- Poor performances upstream ESCC still have negative influences on the order-driven secondary production.
  caused by: delayed introduction of a new product-release (incidental);
  poor integration between EBC and ESCC;
  wrong priorities, informal contacts have influence on the supply from EBC. There is information that EBC should provide the Swedish RLC better.
- The European legislation not homogeneous.
  Different rules in each European country make the it more difficult to use international concepts like VAL.

The success of the implementation of the RLC-concept depends fully on the co-operation of the involved parties.

8.3 Recommendations

Integral co-ordination between ESCC and the LCs
The evolution has to be continued. The RLC-concept is not finished yet. VAL is used for the simplification of the logistic structure. In this point of view VAL is a successfully used. Centralisation of logistics is Ericsson's way to introduce integral co-ordinated logistics.

The big advantage of the simplified structure is an potentially increased controllability. The simplified structure makes integral control possible. Centralisation of logistics is a start. This beginning is quite difficult because the people who are involved still try to optimise their local situation instead of the global situation. Local companies which already join the latest concept consider the ESCC often still as a supplier not as a partner with the same objectives. Sometimes it seems that the organisation is not ready for integration yet. The success of the RLC-concept will be determined by the co-operation between all parties. Local thinking undermines the promising objectives.

So the next stage has to be integration of all concerned parties. This means not only on paper but in practise. The condition for integration is mutually confidence and co-operation. Integration downstream the RLCs is more a case of behaviour now the structure is prepared. Upstream is another story.

Integration between EBC and the RLCs
The lack-of-material problems in spring last year showed the dependence of ESCC towards its suppliers. One of the more important objectives of the RLCs is to prevent that problems which occur upstream have a negative influence in the downstream direction. It is important that the material form EBC is correctly devided over the RLCs.

EBC is the largest and the worst supplier of all. Integration in this direction is hardly organised. In this part of the chain many improvements can take place by integral control. The advantage of integration is that market information becomes immediately available for every party in the value chain. This makes it possible to adjust the efficiency driven order-flow from EBC to the latest developments in the market. Therefor all flows of material within the value chain can be improved.

Implementation might be much easier than the integration between the local companies and ESCC because the number of involved parties is less and because the RLCs have already gained much experience according to integration. But the most important reason why upwards integration is relative easy to implement is the fact that there are no client-orders involved because the CODP is located at the RLC. The number of orders between the RLC and EBC is therefor much less than the number in the downstream direction.

Salient detail is that EBC also supplies the RLC which is located in Sweden as well . It seems that this RLC is better supplied than ESCC. The same problem occurs here, no global thinking. The supplying units determine their own priorities.

Internal process of ESCC
The local market requirements are different. The demanded time-to-market in Spain is for instance shorter than anywhere else. It can not be the purpose to adjust ESCC's internal processes and priorities to every local situation. ESCC's internal processes have to be as simple as possible. So they have to be uniform. This means that it has to be possible that all local companies are served according the same standards. It is up to ESCC's subsidiaries and the LCs not to abuse ESCC's capacities. Do not spoil the market or do not extend the negotiation time knowing that ESCC will deliver according the shortest delivery times.

Local stocks
Local stocks established in the "neighbourhood" of a RLC have no right to exist. The performances will remain the same when the local hubs are removed because the distance (time) between the RLC and the hubs/stocks is small.

Expansion
ESCC can expand by:
- integration;
- assortment;
- geographically.

Extension of the assortment is preferable because of the modular product-oriented organisation structure of the ESCC. Each product in the current assortment is controlled by one team. Meaning, all activities for the sourcing and supply, like purchasing, planning etc. are carried out by a dedicated group of people. Each new product of the assortment will be controlled by a process that will not influence any other already existing one. The preference of expansion of the assortment above geographically growth is that the number of interfaces will be remain the same.

APPENDIXES

LIST OF APPENDIXES

APPENDIX 1: MD110 BUSINESS COMMUNICATION SYSTEM

Introduction

The MD110 Business Communications System is a digital communications system designed to function in business environments. Geographically dispersed organisations often require unique configurations to accommodate environmental restrictions. The MD110's distributed architecture can be combined with a variety of transmission media to create a totally customised network. The MD110 is available in two different types of capacity. While each type is optimised for a specific market application, they all share fundamental similarities in design. Each version of the MD110 is a modular, digital communications system which transmits voice and data simultaneously over a single pair of wires. The MD110 is not tied to a specific system configuration; instead, it allows customers to build a system or their own network, to meet their unique requirements with the versatility to modify and expand in both size and functionality.

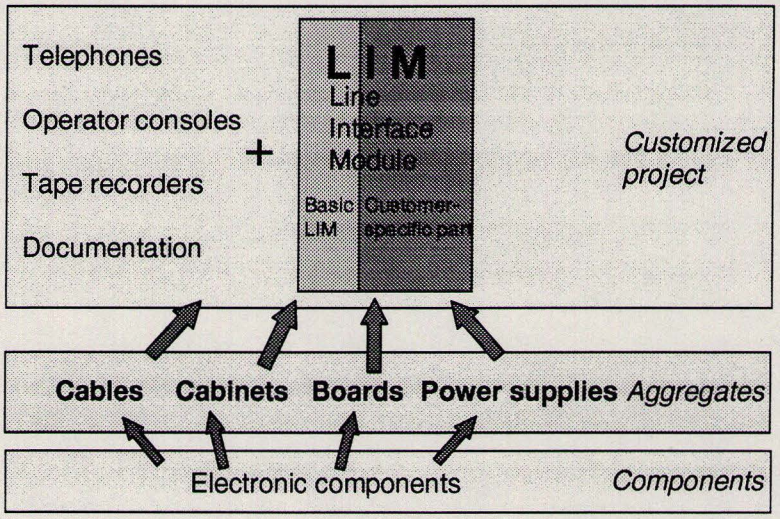


figure A1.1: Structure MD110

Modularity

The MD110 uses modular hardware and software in a building block approach for flexibility of system configuration. In their simplest form, the MD110 consist of a single entity called a Line Interface Module (LIM). The LIM is a microprocessor controlled switching system equipped with all elements necessary for call processing. As the MD110 grows in response to traffic demand, more LIMs are added and interconnected via a Group Switch (GS). The Group Switch makes it possible for a device served by one LIM to communicate with devices served by another LIM. Each LIM contains all of the necessary regional software to ensure complete control of call processing within the LIM. The GS is a passive device which is controlled by the LIMs.

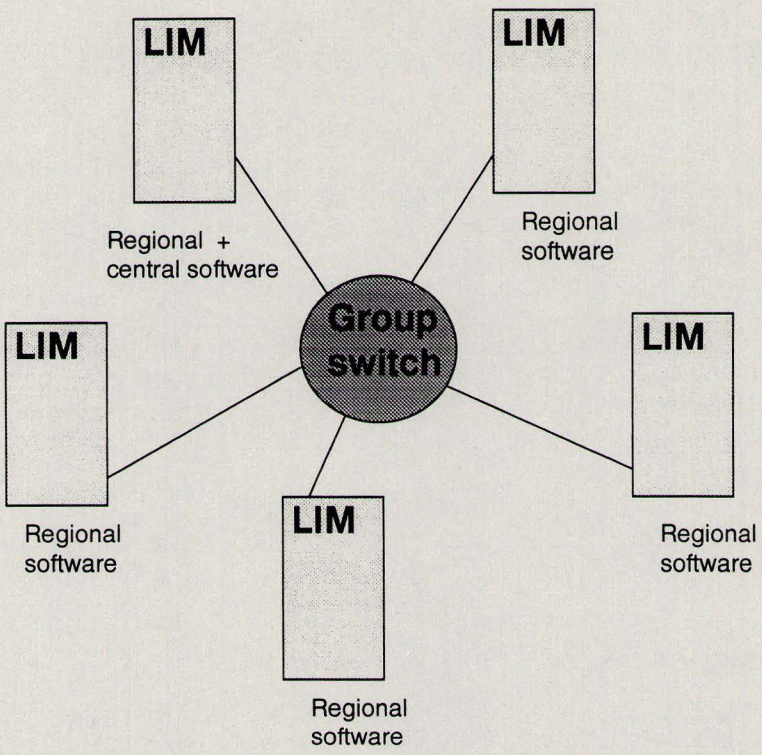


figure A1.2: LIM network

Ibercom packages
Ibercom packages are standardised LIMs. The packages are only sold on the Spanish market by Telefonica. The extreme short time-to-market is the reason why the packages are delivered out of stock. Delivery from stock means that the production has to be forecast driven. This concept makes standardisation of packages necessary. Therefor 32 different types are specified.

The market does not ask for standard LIMs. The packages have to be adjusted to the end-users requirements. The customising takes place by adding the client-specific material. Most of the material is shipped from the ESCC. The assembly of these additional items is usually combined with the installation activities on site.

Storing all 32 different types would cause high stock levels. Therefor only 5 basic Ibercom packages called Logistic packages are produced on forecast. The remaining 27 are easily to complete by adding extra material. Assembly of these items takes place on site.

APPENDIX 2: ESCC'S ASSORTMENT

product (division)	activities	area of distribution
MD110 (BZ)	sourcing customising & test swap & repair upgrading	Western-Europe
Financial Systems & Control Systems (BZ)	sourcing customising & test swap & repair upgrading	World-wide
Eripax (BZ)	sourcing customising & test swap & repair upgrading	World-wide
Freeset (BZ)	packing* swap & repair	World-wide
GSM Mobile phones (BR)	packing* swap & repair	World-wide
Mini-Apank (BX)	sourcing customising & test swap & repair	not introduced yet
Cables	assembly	Inter company

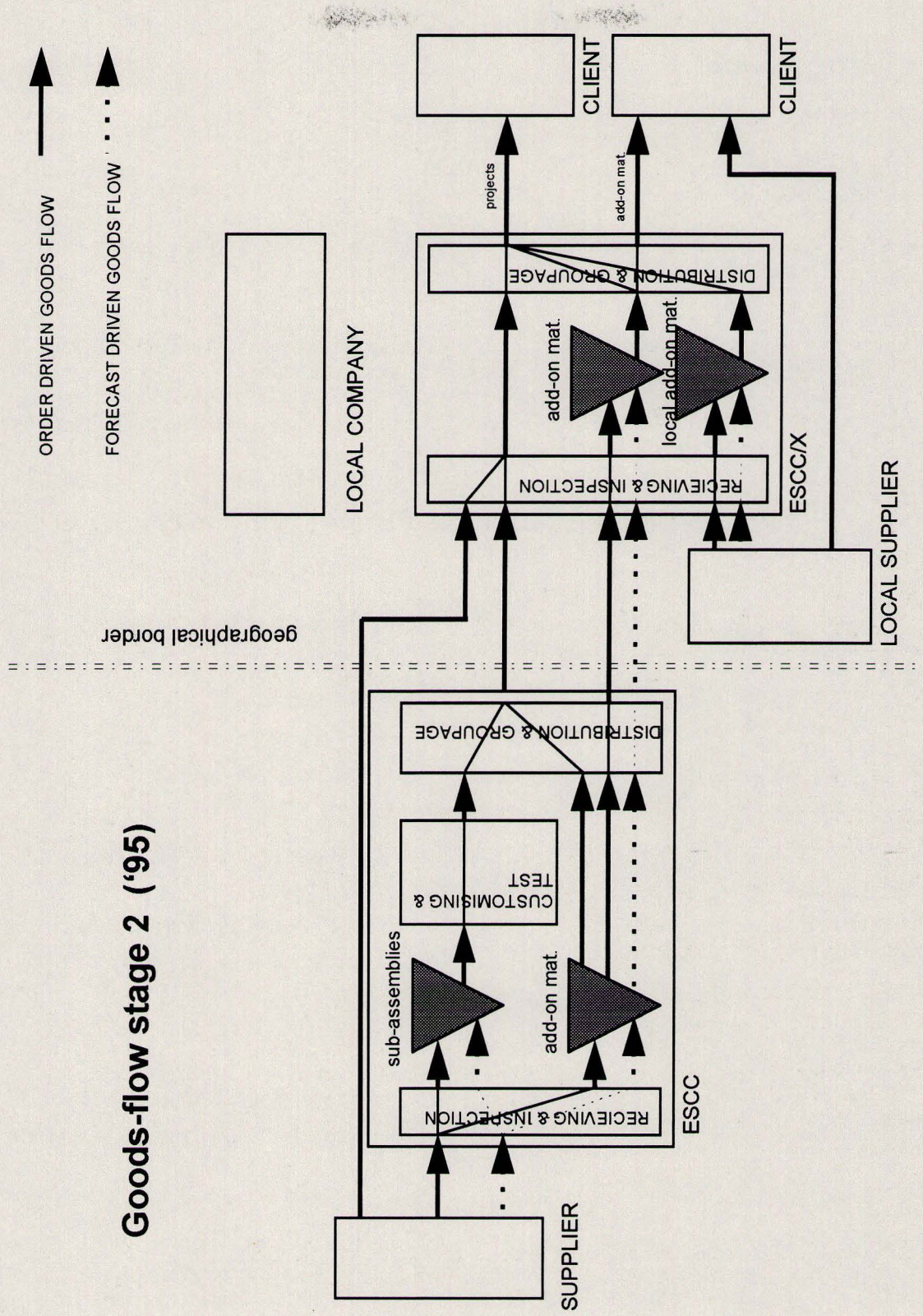
* packing: includes: packaging
adding documentation (land-specific)
stickering (land-specific)

APPENDIX 3: APPLICABILITY OF SIMULATION

	changes compared to 1990	part of the costs	simulation possibilities	impact on perfor-mances	analyses: -simulation -qualitative -other -non
I Strategic					
Product management	0	*	0	0	n
Development	0	*	0	0	n
Engineering	0	*	0	0	n
II Tactical/Operational Forecast driven					
Sales forecast	0	0	0	+	n
Planning	0	0	0	++	o
Purchasing	+	0	0	+	o
Manufacturing (sub ass.)	++	+	+	++	s
Distribution	++	0	+	+	s (transport)
Stock control	++	+	0	++	s
III Operational Order driven					
Sales	0	*	0	0	n
Sales order specification	0	+	++	++	s
Material specification	0	+	++	0	n
Purchasing by order	+	+	+	++	s
Order intake	0	++	++	+	s
Technical control	0	0	++	0	n
Sales order administration	0	+	++	+	s
Planning	0	0	+	+	n
Stock (sub assemblies)	++	0	+	++	s
Assembly	++	+	++	++	s
System test	++	++	++	++	s
Distribution to LC / ESCC/X	++	0	++	+	s (transport)
Stock (standard systems)	++	0	+	+	s
Re-assembly	++	0	++	+	s
Pre-installation test	++	++	++	+	s
Distribution to site	++	0	++	+	s (transport)
Final test	+	0	++	+	s
Installation	+	++	++	+	s
Invoicing	0	0	+	0	n

0:	unimportant
+:	moderate
++:	important
*:	not applicable

APPENDIX 4: GOODS-FLOW STAGE 2



APPENDIX 5: CHANGES IN THE LOGISTIC CONCEPT BETWEEN 1990 AND 1995

I Strategic/tactical

No significant changes have taken place.

II Forecast-driven activities

The forecast-driven activities have as objective to secure the supply from primary production to the secondary production.

Sales forecast:
ETM forecast in earlier days only the sales for the Dutch market. Since the foundation of the ESCC is Ericsson Rijen however supplier for Western Europe. Because the ESCC became responsible for the decoupling stock, it became necessary to expand the forecast activities. To make an accurate forecast ESCC uses the forecasts of the LC's. EBC, as main supplier, does the same using the information of the four RLC's.

Planning:
Planning is based up on received orders and forecasts. The reason for the expansion of this activity at the ESCC is the same as just mentioned.

Purchasing:
Because customising and assembly have been centralised in Rijen the majority of the sub-assemblies have to be shipped via, and controlled by the ESCC. There was no longer any reason for decentralised purchasing. Concentrating purchasing at ESCC and EBC/K improved the negotiation position in the market, control and declining operational costs.

Manufacturing:
To gain a higher economy of scale it was necessary to centralise the production.

Distribution:
The distribution of sub-assemblies at local level stopped because the production is centralised.

Stock control:
ESCC has become responsible for all logistic-related activities. Therefor the control has to be concentrated at the ESCC no matter where the material is stored.

III Order driven activities

All order driven activities for the Western Europe market have been moved from EBC/S to the ESCC because the CODP is located at the ESCC. EBC/S has become just a supplier for forecast driven items.

IIIa Order-specification

Sales order- and Material- specification:
Take both place at the local company as well as at the ESCC. The specification function at the local company is expanded with specification of material to decrease the lead-time of the order process.

Purchasing by order:
For products stored at the local market as well as in Rijen is the ESCC responsible for the control including purchasing.

IIIb Sourcing

Order-intake, Technical control, Sales order administration and Planning:
These activities moved from EBC/S to ESCC according to the changed position of the CODP.

Stock (sub assemblies):
The stock at the ESCC has been expanded because of the centralised assembly. Local stock at the LC is partly moved to Rijen, the rest is stored at local public warehouses (hubs). All stocks are controlled by the ESCC.

Assembly and System test:
Moved to the ESCC.

Distribution to lc / escc/x:
The major goods flow to the local companies is descended from the ESCC. The distribution is controlled by ESCC, the transport is sourced out.

Stock (standard systems) and Re-assembly:
Both are no longer necessary.

Pre-installation test:
Moving pre-installation tests to the ESCC made drop-shipments to site possible. Centralising pre-installation test has become possible because re-assembly at the local companies is no longer necessary.

Distribution to site:
All items are shipped via the local public warehouse (hub). Here local stored items are combined with projects from the ESCC and shipped to the site. ESCC is responsible for the control, the transport is sourced out.

Final test and Installation:
Both are still done by the local companies.

APPENDIX 6: CLIENT ORDER DECOUPLING POINT (CODP)

Theory CODP
The CODP is the determining variable in the control-concept. The CODP decouples the order-driven and forecast-driven part of the production. By decoupling the production in two stages, (primary and secondary production) both can be adjusted to the concerning situation. The main stock is usually located at the CODP. There are no unnecessary stocks downstream the CODP. Stocks are only allowed upstream when they are economical justified.

There are 5 possible CODP-locations. The position depends on market requirements, such as time-to-market and process characteristics like lead-times in the production and distribution. The 5 different CODPs are:

1. production and distribution to local stock fully on forecast;
2. production on forecast;
3. assembly on order;
4. production on order;
5. purchasing and production on order.

The production in the VAL-concept is determined by assembly on order (CODP-3). The assembly is order-driven while the production is forecast-driven. The decoupling stock contains aggregates needed for the assembly process.

The advantages of moving the CODP upstream is less capital employed by expensive local stored material. The more flexible the organisation is, the further upstream the CODP can be moved.

Relationship between the CODP and risks.
There are three kinds of risks that are related to the position of the CODP:
- capital employed by fixed investments;
- the fulfilment of delivery obligations;
- capital employed by stocks.

CODP-5, purchasing and production on order, has no risks concerning stocks. The main problem is how to complete the project in time. CODP-1, production and distribution to local stock on forecast, is the best prepared for high demanding delivery performances. The disadvantage is however the amount of capital that is occupied by material on stock. The VAL-concept has to deal with all three kinds of risk categories. Measures to reduce the risks are:
- *stock-related risks*
    - improve forecasts, used at the MPS-level;
    - increase market research;
    - improve product structure (modularity), to increase the forecast possibility of modules;
- *performance-related risks*
    - decrease lead-times;
    - improve process-control;
    - improve relationship with supplier;
    - use more suppliers for the same products.

APPENDIX 7: KEY VARIABLES

This appendix contains the investigated product-, market- and process-characteristics as far as not mentioned in the report already.

Product characteristics

Lifecycle length
The lifecycle length concerns the BC-releases and not the time that the MD110 will be installed. New releases can differ a lot from the former versions, therefor the MD110 can not be considered as an uniform product. Sub-releases are not taken into account because the changes are not functional but only concern small improvements.

Short life-cycle lengths are responsible for obsolete products. VAL makes it possible to reduce the stock-level of sub-assemblies and eliminates stocks containing final-products. The lifecycle length of the release-versions is the shortest of all because not all sub-assemblies are changed when a new BC-version is released. The total lifecycle can be split into a several number of stages. These stages are not fully corresponding to the general classification known from the marketing literature; introduction, growth, maturity and decline.

1 Introduction of a new MD110-release .
The releases are not introduced in each country at the same time. The sales volume is therefor slow increasing in the first stage. Several sub-releases will never be available in some countries because the costs for the introduction, for example tests by the national PTT and fees for licenses, make a new introduction not profitable. The release-dates of the last two versions are shown in the table below.

Introduction releases		
local company	BC6	BC7
EBR	92-04	94-09
EBD	92-11	94-06
EME	92-02	94-11
ETL	92-04	94-11
FAT	93-03	94-12
EBI	92-04	94-10
ETM	93-03	94-04
SEP	93-03	94-11
EAS	92-10	94-09

table A7.1: Release introductions

2 The release becomes the standard.

The release is introduced at each local company. The demand reaches its top.

3 The next release is introduced
There is a new release but the current one is still used for customers who definitely want this version because they already own one and want to expand their current MD110 services.

4 Service purposes.
All the subassemblies, or their downwards compatible substitutes, have to be available for service purposes for eight years after the production of the concerning version has been stopped.

Major changes caused by a new release take place with an interval of just about two years. Major changes have an influence on the functionality. The minor modifications (sub-versions) are meanly small improvements and solutions for defects. These modifications can take place up to twice a year. This situation is comparable with the software-industry. The difference with the software industry is that an old software release is almost worthless at the moment a new release

introduced. When a new MD110 version is released just a small percentage of all sub-assemblies is changed which will not become obsolete within the next few years.

In general we can say that the lifecycle length for installed basses is just about five till eight years. For subassemblies can this be much longer (as service-part or just because the item does not change while a new BC-release is introduced). New sub-assemblies are downwards compatible. This means that new items can be installed in old projects. The advantage is that production of old sub-assemblies can be stopped anytime. Therefor the number of obsolete items can be minimised. Disadvantage is the high development cost.

Variety/wideness of assortment
Inventory costs, interest as well as material handling, depend on the number of different products in stock. First because each item needs its own safety stock. Second because an extensive assortment usually causes an unstable demand per type of product. The safety stock level is in proportion to the variance of the demand and is therefore high.

Characteristic for VAL is the elimination of the final product stock because the assembly is order driven. The wider the diversion, the larger the possible benefits. Another distinguishing mark is centralisation of the assembly activities leading to reduction of subassemblies on local stocks.

The variety of MD110's assortment is almost unlimited because of the client depended character of the final products. For this reason the projects are not in stock but sub-assemblies and add-on material with a higher degree of communality. The assortment of products delivered by the ESCC, concerning MD110 contains, the MD110 itself, add-on material and sub-assemblies as service and upgrade items.

Commonality
Commonality means that a component or subassembly is used in a several number of types of products. Communality makes it possible to have a large assortment with a limited number of sub- assemblies.

Commonality is an important key variable in the VAL-concept because this determines the possible reduction of stock. Because of the order-driven assembly of sophisticated products such as MD110-projects with a big variant-explosion, the advantages for the production according the VAL-concept are numerous. Increasing the number of universal items decreases the number of products that have to be stored in a safety stock when the final assembly is order driven.

The number of assemblies depends among other things on the capacity of the MD110. The MD110-stackable can be build up out of 422 different assemblies. Just about 50 assemblies are standard in each project. This is half of the average project's contents. The commonality is that low that assembly on forecast is not profitable. Evaluation of software however increases the commonality because the software dictates more often the function of the component.

Number of subassemblies per project
The advantages of the VAL-concept are in proportion to the number of subassemblies/modules per project. The number of modules is dependant on the clients requests. In the MD110 situation it is not possible to describe the average project. In general a stackable project will contain 100 sub-assemblies.

Market characteristics

The Spanish market share
Spain is one of Ericsson's largest markets (figure A7.1). That is one of the reasons why implementing the RLC-concept can gain many benefits. Other important countries already join the new concept (Germany, UK and Belgium). The Spanish market share is slightly growing (figures A7.1 till A7.3). The number of LIMs is shown instead of the turnover because the turnover is subjected to changes in transfer prices in time as well as to outlet.

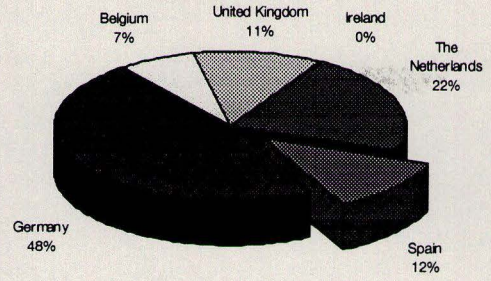


figure A7.1: Shipments from ESCC (LIMs) in '93

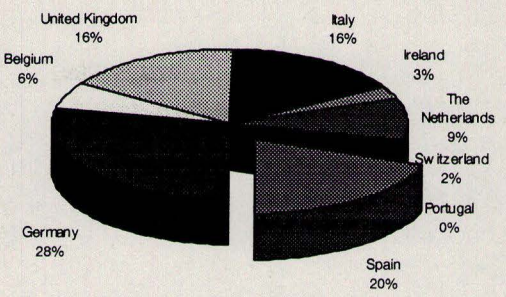


figure A7.2: Shipments from ESCC (LIMs) in '94

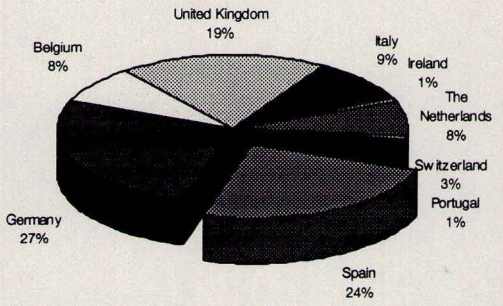


figure A7.3: Shipments from ESCC (LIMs) in first half of '95

Sales-predictability

The safety stock depends on the sales-predictability to guaranty a secure supply. When the sales-forecasts are very accurate the stock can be minimised. Because of the huge number of varieties of final-products it is impossible to produce fully on forecast and is it hard to make an accurate estimation of expected sales on project-level. Predicting the number of sub-assemblies and modules makes more sense because of communality. Producing on order increases the time-to-market beyond any acceptable limit. A compromise is found by order-driven assembly and an efficient production on forecast.

The sales-forecast depends on the estimations that are made by the local companies for their national market. The forecasts are made according a standard format, called MORE. This tool asks the local company to forecast not the number of systems because none of the projects is the same but at a more detailed level. The forecast is based upon the expected sales of lines(-boards), mini-systems and modules. The local estimations are interpreted using experiences from the past and combined into one general estimation for the western European market. In combination with the LIM-planning the safety stock is determined.

The difference between the forecasts with a frozen period of two months and the real demand is plus/minus 20%.

Demand pattern

With variability of demand in this case is mend, the differences in sales-volume in a short period, up to one year. Season indices try to describe the variations according a pattern. Variability of demand requires a high safety stock or flexible capacity. When the season indices are more or less constant, these figures can be used for estimation purposes.

Implementing VAL moved the CODP from "semi"-order-driven assembly to order-driven assembly. Semi-order-driven assembly means re-assembly of forecast-driven projects according orders. The production of subassemblies remained fully forecast driven while the assembly became fully order-driven. Benefit is an increasing time to react on changes in demand.

In figures A7.4 and A7.5 the sales are shown for the years 1993 and 1994 for LIMs as well as lines, shipped from the ESCC. Searching for season indices is hard because the lack of historical

data because the ESCC only serves since a couple of years and for a lot countries just recently. To give an impression of possible indices only the sales-figures for the four longest served local companies are used. Sophisticated time-series techniques such as exponential moving average can not be used, therefore the average is stroked of the sales for both years.

According to the figures it seems that there are season influences. Conclusion can however not be drawn because the pattern does not fully repeat itself and because the number of observations are limited. That there are significant fluctuations is clear. The average project installed in one of the four concerning local companies seems to become smaller. The number of lines in 1994 declined while the number of LIMs increased.

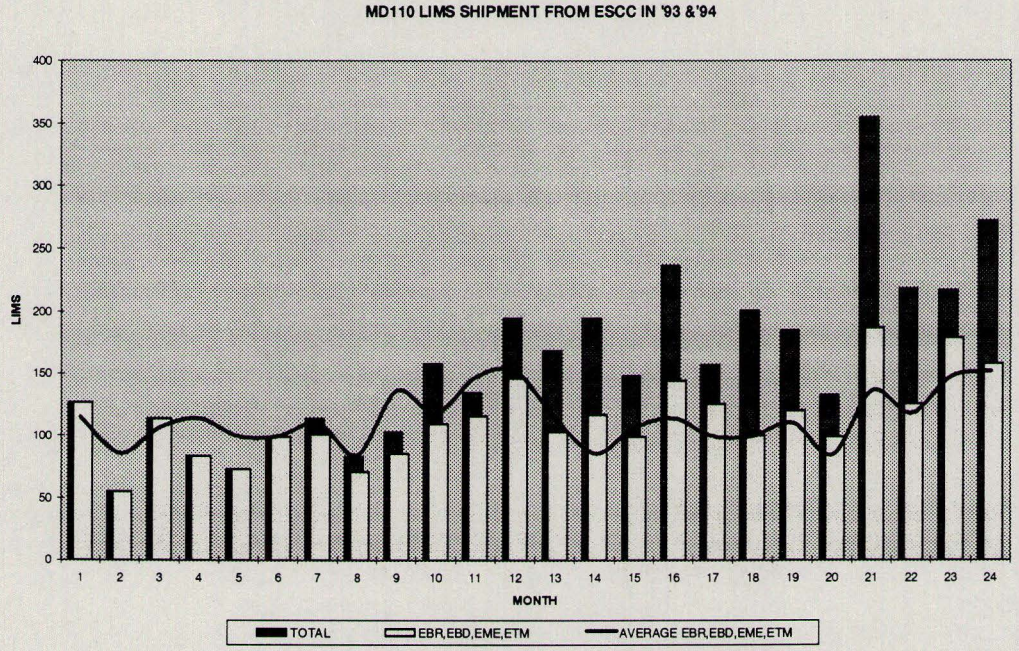


figure A7.4: Shipments from ESCC (LIMs) (Jan. '93 - Dec '94)

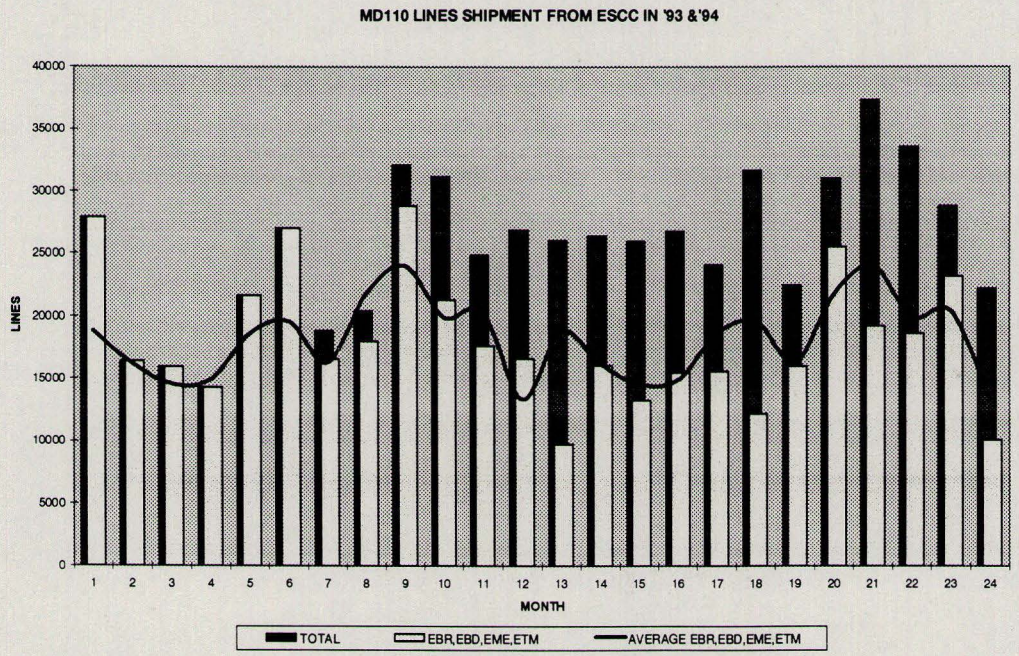


figure A7.5: Shipments from ESCC (Lines) (Jan. '93 - Dec '94)

Correlation between local sales-volumes
This characteristic describes if there is a relationship between sales in the different countries. The values of the correlation vary from -1 to 1. Values of -1 and 1 imply perfect straight-line relationships between the two compared variables. Zero means that the variables are independent, meaning there is no relation at all.

Variations in demand determine the needed safety stock. Centralising the control over the stocks can be a way to reduce the total inventory level. The reason is that the sum of all individual variances in demand is larger then the variation at the central stock. Condition is that the sales have to be mutually independent. When the demand is fully independent the variation at the central stock is the square-root of the number of sales-locations times smaller then the sum of variances at the sales-locations [18] . The safety stock can be reduced with the same factor. Centralising offers advantages when the correlation is low or negative. Negative means that when the sales in one location increases the demand in the other place goes down.

CORRELATION	**LIMS**								
	BE/EBR	DE/EBD	ES/ECE	GB/ETL	IT/FAT	IE/EBI	NL/ET	PT/SEP	CH/EAS
BE/EBR	1.00								
DE/EBD	.21	1.00							
ES/ECE	.21	-.08	1.00						
GB/ETL	.00	-.01	.17	1.00					
IT/FAT	.56	.40	.33	.07	1.00				
IE/EBI	.44	.42	-.05	-.19	.59	1.00			
NL/ETM	.19	-.22	-.21	-.26	-.18	-.12	1.00		
PT/SEP	.31	-.21	.54	.21	-.23	-.35	-.01	1.00	
CH/EAS	.50	.51	-.42	-.06	.50	.25	.05	-.24	1.00

table A7.2: Correlation between the local sales-volumes (LIMs)(Jan 1993- Jul 1995)

CORRELATION	**LINES**								
	BE/EBR	DE/EBD	ES/ECE	GB/ETL	IT/FAT	IE/EBI	NL/ET	PT/SEP	CH/EAS
BE/EBR	1.00								
DE/EBD	.00	1.00							
ES/ECE	.05	-.33	1.00						
GB/ETL	-.18	-.06	-.24	1.00					
IT/FAT	.31	-.21	-.32	-.20	1.00				
IE/EBI	.18	.48	-.07	-.13	.08	1.00			
NL/ETM	-.08	-.27	.34	-.26	-.23	.38	1.00		
PT/SEP	-.19	-.12	-.28	-.08	.38	.20	.57	1.00	
CH/EAS	-.16	.55	-.67	.07	.49	.70	.09	.10	1.00

table A7.3: Correlation between the local sales-volumes (Lines) (Jan 1993- Jul 1995)

The demand at the different local companies is not fully independent. The correlation between the most important local companies (four oldest clients of the ESCC) have the highest confidence level because the number of observations is the largest. Especially these correlations are low or negative. This means that centralising might have advantages. It is not possible to be sure because the comparison has taken place on a high abstinence-level. The number of lines and LIMs is compared and not the actual items.

Demanded delivery performance
More important than a short time-to-market is an accurate delivery. A safety stock and an effective organised assembly organisation are necessary to realise a high delivery performance.

You may ask yourself if time-to-market and delivery performance are really that important. Users usually buy a product because of its price and potentialities. Service, including delivery performances is a way to distinguish in this market. For the ESCC there is an additional reason to strive for excellent service. ESCC's clients are the local companies. ESCC tries to expand its assortment and is therefor dependent on the LC's and LME. They are prepared to use ESCC's services when the performance is good.

ESCC and ECE strive to reach a delivery performance of 96% for add-on material as well as for systems. The norm for the delivery date plus three days is 100%.

Import taxes
The more value is added in the country where the products are sold the less taxes have to be paid. For components and subassemblies produced in counties which are member of the European Union no taxes have to be paid. The main suppliers including EBC/s are located in Sweden. The entry of Sweden to the European Union will have important advantages for Ericsson.

Distributors
- Télefonica 82% of the turnover*
- ECE (direct sales) 18%

Télefonica is Ericsson's only distributor in Spain. Ericsson is therefor fully dependant on Telefonica's efforts. ECE's direct sales are mainly special projects (97%*). Special projects are usually large turn-key projects. Télefonica and ECE have price-contracts for one year, this simplifies ECE's sales-function.
* ZPBM (MD110-related products), 01-01-'95 - 28-06-'95, details see appendix 9

2nd hand material
Télefonica has 117 LIMs in store (releases from '92-'94). This is observed as a dangerous situation because Télefonica can decide to sell these products (total sales in '94: 500 LIMs). Télefonica has not sell these LIMs because the costs of upgrading will approach the prices of new installations which have been decreased last few years.

Price reduction
Prices used to be high. Spanish sales prices have been reduced to 64% of the level of '93 due to potential competition.

Installed bases
The 700,000 installed lines (installed bases) of Ibercom packages are responsible for an significant part of the turnover: (appendix 9) This share is growing faster than the supply of LIMs.

upgrading:	7%
expanding:	9%
movements:	1%
de-installation	1%

The number of add-on orders will increase faster than project orders due to the growing number of installed bases.

rent
Télefonica also rents PABXs and extensions. The end-user can easily decide to replace its installation. This problem effects especially Télefonica. This is the reason for the upgrading of 515 LIMs in 1995 to keep the installed projects in shape according the latest developments.

Process characteristics

Disintegration of the production-process
Disintegration of the production-process in time and place is on of the conditions to implement VAL. VAL is characterised by a disintegration of the production in two geographical separated parts. The production-process of the MD110 can be devided in three parts. First forecast-driven subassembly production mainly in Sweden and second the order-driven assembly at the ESCC. Finally the local companies are responsible for the installation on site. Assembly at the ESCC and the installation on site will be called the secondary production in the rest of this report. The primary

and secondary production are split by a stock, so the primary production will not influence the flexibility.

Primary production
Because the CODP at the ESCC is placed after the assembly of the logistic packages the primary production activities (forecast driven) are:
- production of sub-assemblies;
- assembly of logistic packages.

Secondary production
The order-driven secondary production contains:
- consolidation at ESCC;
- distribution;
- consolidation at ECE;
- installation / customising / re-assembly.

The secondary production lead-time is important because it is together with order-intake and specification responsible for the time-to-market. The current lead-time is long because time that is used for installation also includes re-assembly. The time spend in Spain is also extra increased by the lack of material due to incomplete deliveries.

Changes in volume and weight
The volume, weight and distance determine the transport-costs. The production process is characterised by an constantly increasing volume of the products while the weight remains the same. It is important to move the volume-explosion as close as possible to the site, to reduce the to be transported volume.

Because standard projects do not exist it is not possible to describe the expected increasing volume during assembly. Another way to investigate this characteristic is to compare the volume of the in- and outbound. This figure is however not available. A conservative estimation of the volume-explosion factor is 1-1.5 (increase of 0-50%). The location of the RLC-centre is hardly influenced by these characteristics due to this relative small explosion of volume and weight.

Explosion of the number of variances
The total number of items in store is determined by the number of variances. The explosion of the number of variances describes the changing in the number of variances during the production-process. The VAL-concept is characterised by an order-driven assembly. Assembly on order is usually a diverging process.

The minimum number of different items is in Ericsson's case stored at sub-assembly level while the number of variances is maximum at project-level. The biggest explosion takes place during customising. The number of different sub-assemblies for, for example a MD110-stackable is 442, the number of project-variances is almost infinite.

Local sourcing
The advantages of local sourcing are less transport and inventory costs while the costs per item may be higher because the absence of quantity discount and extra purchasing efforts. The inventory-levels decline because reduced transport-times. This benefit is very minimal due to the short transport times within Europe. Local sourcing always has been implemented in Ericsson's logistic concept for the production of MD110-projects. The introduction of the VAL-concept made the importance of local sourcing less because local companies stopped the production of sub-assemblies and customising on a large scale.

Five percent (value) of ECE's material is locally sourced. ECE's wish is to reduce local sourcing as much as possible. In the new concept it has to be controlled by ESCC. The only two reasons to maintain local supply are:
- material is cheaper if sourced locally;
- there are no substitutes for the locally sourced material.

Import duties are not important because Spain as well as the Netherlands are both part of the European Union.

Forecast
Télefonica supplies ones a month a forecast with a horizon of two months concerning movements and packages. ECE's forecast is based upon this information. Each month they supply ESCC with this information. The quality of these forecasts has increased a lot last year.

Specification quality
Only 3% of the Ibercom projects is changed during the process-time.

Sales function
Packages are not sold by ECE but by Télefonica. Once a year contract negotiations between both parties take place. The function of ECE's sales department is order processing. The first picture below shows the current situation (figure A7.6). Local Télefonica-departments send their orders to the Télefonica headquarters in Madrid. This head-quarters on their turn send the order to ECE. In the new situation all subsidiaries will have contact with ECE reducing the communication time (figure A7.7).The subsidiaries send the informal orders directly to the ESCC to speed up the supply process. The formal order needed for administrative purposes follows later, via the Télefonica headquarters.

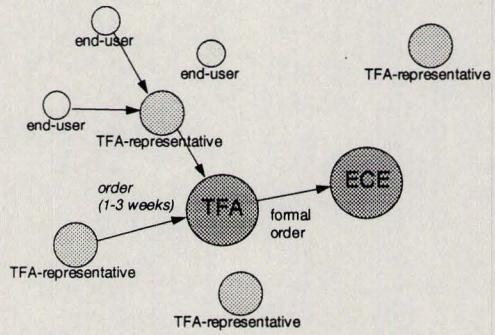


figure A7.6: Current order process Télefonica

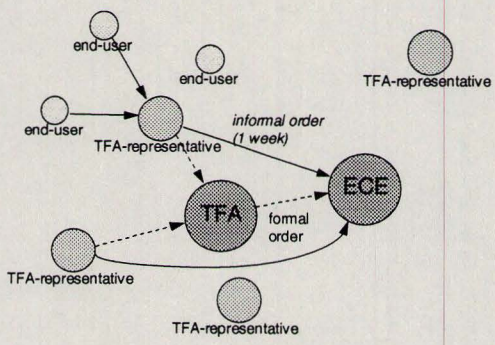


figure A7.7: New order process Télefonica

APPENDIX 8: SALES, ECE FIRST HALF OF 1995

source: Rafael Faura Petisco
currency: NLG

ZPBM	MD110	period:	01/01/95	28/06/95	
		prices: standard	final	percentage of Telefonica's turnover (final)	percentage of total turnover (final)
TELEFONICA					
a	upgrade			8%	7%
b	add-on material for already installed projects			9%	8%
c	as b but Telefonica-owned			2%	1%
d	add-on material			14%	11%
e	movements, end-user remains the same			1%	1%
f	2nd hand material, Telefonica-owned			3%	3%
g	de-installation and transport			1%	1%
h	special products			13%	11%
i	installation			0%	0%
j	course			0%	0%
n	regular sales, no package			7%	6%
p	package			41%	33%
r	repair			0%	0%
total Telefonica				100%	82%
DIRECT SALES				percentage of direct sales sales turnover (final)	
a	upgrade			0%	0%
c	as b but Telefonica-owned			0%	0%
d	add-on material			3%	1%
e	movements, end-user remains the same			0%	0%
g	de-installation and transport			0%	0%
h	special products			97%	17%
n	regular sales, no package			0%	0%
r	repair			0%	0%
total direct sales				100%	18%
total ZPBM					100%

		percentage product-group	percentage total ECE
ZBMN	FREESET		
TELEFONICA	FREESET/Telefonica	83%	2%
DIRECT SALES	FREESET/direct sales	17%	0%
ZDNS	ERIPAX		
TELEFONICA	ERIPAX/Telefonica	6%	0%
DIRECT SALES	ERIPAX/direct sales	94%	1%
ZPBM	MD110		
TELEFONICA	MD110/Telefonica	82%	68%
DIRECT SALES	MD110/direct sales	18%	15%
ZPBO	BUSINESSPHONE		
DISTRIBUTION	BUSINESSPHONE/distribution	21%	3%
TELEFONICA	BUSINESSPHONE/Telefonica	21%	3%
DIRECT SALES	BUSINESSPHONE/direct sales	58%	8%
TOTAL Telefonica		73%	
TOTAL direct sales		27%	
TOTAL (ECE)			100%

APPENDIX 9: SALES AND CORRELATION, IBERCOM PACKAGES DELIVERIES FROM ESCC, JUL. '94 - JUN. '95

year	94	94	94	94	94	94	95	95	95	95	95	95	SALES	SALES	TURNOVER	TURNOVER
month	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	95	TOTAL (NLG)	95 (NLG)
package																
48PR	2	2	5	9	7	11	1	8	8	9	8	6	76	40		
64PR	8	0	4	3	4	6	7	5	5	5	3	1	51	26		
88PR	3	0	2	0	2	4	1	3	1	1	1	3	21	10		
96PR	1	0	0	1	0	1	0	1	2	1	0	1	8	5		
120PR	2	0	2	0	4	0	0	0	0	3	1	1	13	5		
TOTAL 48PR				13	17	22	9	17	16	19	13	12	169	86		
128PR	1	2	3	3	4	7	2	7	4	2	1	0	36	16		
144PR	1	0	1	1	0	3	1	0	2	0	0	2	11	5		
160PR	2	0	1	2	4	3	0	0	0	1	2	1	16	4		
176PR	0	0	0	0	0	0	0	0	0	0	2	0	2	2		
192PR	1	0	1	1	0	1	0	0	0	0	0	1	5	1		
208PR	2	0	3	1	0	1	0	0	0	0	1	0	8	1		
224PR	1	0	0	0	2	0	1	3	1	0	1	2	11	8		
TOTAL 128PR				8	10	15	4	10	7	3	7	6	89	37		
48SC	2	0	3	0	2	3	3	5	3	2	2	1	26	16		
64SC	9	0	2	3	5	6	1	0	0	2	0	0	28	3		
88SC	2	0	0	0	0	2	0	0	0	1	2	0	7	3		
96SC	2	0	0	1	1	1	0	0	0	0	1	0	6	1		
120SC	2	0	0	0	0	2	0	1	0	0	0	0	5	1		
TOTAL 48SC				4	8	14	4	6	3	5	5	1	72	24		
128SC	1	0	1	1	1	1	3	3	1	3	0	0	15	10		
144SC	1	0	0	0	0	0	1	0	0	0	0	0	2	1		
160SC	2	0	3	0	1	1	0	1	1	0	0	0	9	2		
176SC	1	0	0	0	1	1	0	0	0	0	0	0	3	0		
192SC	2	0	0	0	1	1	0	0	0	0	0	0	4	0		
208SC	1	0	3	0	0	0	0	0	0	0	2	0	6	2		
224SC	2	0	0	0	0	0	0	0	0	0	0	0	2	0		
256SC	1	0	0	0	0	2	0	0	0	0	0	0	3	0		
272SC	0	0	0	0	0	0	0	0	0	0	1	0	1	1		
TOTAL 128SC				1	4	6	4	4	2	3	3	0	45	16		
GS48	0	0	0	0	1	1	1	1	1	1	0	0	6	4		
GS64	0	0	0	0	0	1	0	0	0	0	0	0	1	0		
GS80	0	0	0	0	0	0	1	1	0	0	0	0	2	2		
GS96	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GS112	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
GS128	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TOTAL GS48				0	1	2	2	2	1	1	0	0	9	6		
TOTAL PACKAGES				26	40	59	23	39	29	31	28	19	384	169		

CORRELATION, Logistic and Ibercom packages, July '94-June '95

Logistic packages

	48PR	**128PR**	**48SC**	**128SC**	**GS48**
48PR	1.00				
128PR	.69	1.00			
48SC	.63	.63	1.00		
128SC	.44	.45	.87	1.00	
GS48	.43	.33	.21	.11	1.00

Ibercom packages

48PR	48PR	64PR	88PR	96PR	120PR
48PR	1.00				
64PR	-0.05	1.00			
88PR	0.20	0.39	1.00		
96PR	0.45	0.24	0.22	1.00	
120PR	0.01	0.11	0.12	-0.27	1.00

128PR	128PR	144PR	160PR	176PR	192PR	208PR	224PR
128PR	1.00						
144PR	0.21	1.00					
160PR	0.13	0.09	1.00				
176PR	-0.28	-0.29	0.16	1.00			
192PR	-0.08	0.61	0.32	-0.25	1.00		
208PR	-0.08	0.15	0.24	0.11	0.66	1.00	
224PR	0.16	-0.19	-0.05	0.03	-0.28	-0.40	1.00

48SC	48SC	64SC	88SC	96SC	120SC
48SC	1.00				
64SC	-0.04	1.00			
88SC	0.06	0.54	1.00		
96SC	-0.19	0.83	0.67	1.00	
120SC	0.34	0.72	0.65	0.60	1.00

128SC	128SC	144SC	160SC	176SC	192SC	208SC	224SC	256SC	272SC
128SC	1.00								
144SC	0.31	1.00							
160SC	-0.02	0.12	1.00						
176SC	-0.13	0.26	0.36	1.00					
192SC	-0.12	0.48	0.43	0.93	1.00				
208SC	-0.28	0.00	0.61	-0.10	0.00	1.00			
224SC	-0.07	0.67	0.41	0.52	0.81	0.16	1.00		
256SC	-0.10	0.19	0.27	0.73	0.67	-0.07	0.38	1.00	
272SC	-0.35	-0.13	-0.24	-0.17	-0.16	0.47	-0.09	-0.13	1.00

GS48	GS48	GS64	GS80	GS96	GS112	GS128
GS48	1.00					
GS64	0.30	1.00				
GS80	0.45	-0.13	1.00			
GS96						
GS112						
GS128						

The correlation between the logistic packages is high. The stock of aggregates that will substitute the logistic packages will get near the amount that was used in the packages in store. The big advantage is that the aggregates also become available for other countries. This fact will lead to the reduction of the stock-levels.

The combination of a high correlation for Logistic packages and the low correlation of Ibercom packages shows that the division in both categories is good for the current situation.

APPENDIX 10: DELIVERY-TIMES AND PERFORMANCES ESCC

sample specifications

month:	March '95
concerning:	ESCC
measured:	lead-times, expressed in working days, per order line
# observations:	18,000 (all kinds of items)
# observations used:	9,000 (MD110 - Basic system, pkode P00)
source:	EDMRT (COPICS)
dates used:	requested date, promised date, order date, actual shipment

terminology

requested date:	date of delivery asked by the local company
promised date:	date acknowledged by the ESCC
order date:	the day the order was taken in by the local company
actual shipment:	date of delivery
requested deliverytime:	= requested date - order date
delivery performance:	= promised date - actual shipment

objectives of the inquiry:

1. To find out what the requested delivery-times are;
2. If there is a need for short delivery-times (two weeks or less);
3. Is there a relationship between the length of requested delivery-times and the delivery performance;
4. Has Spain different requests;

results

1. The most requested delivery-times are 5 and 6 weeks (63%) (figure A10.1), followed by 4 and 7 (28%) weeks. Only 4% of the order lines was asked to be delivered within 3 weeks after the order was handled by the local company.

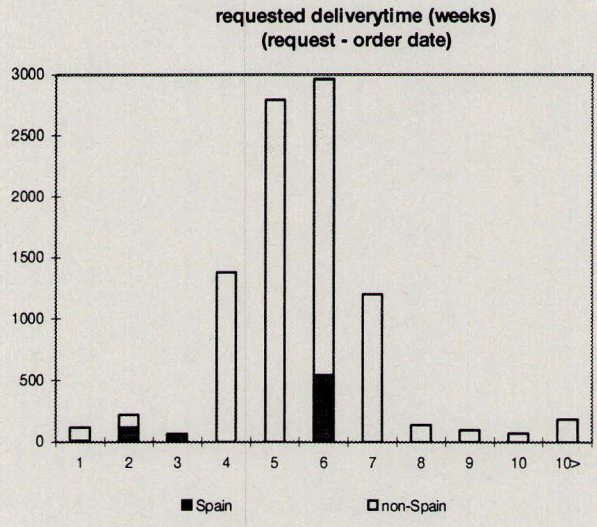


figure A10.1: Requested delivery-time in weeks (Spain and non-Spain)

2. The need to speed up the time-to-market is questionable because it concerns less than 5% of all project orders. (figure A10.1).

1 week:	1%	(116)
2 weeks:	2%	(217)
3 weeks:	1%	(59)

3. Only for very short requested delivery-times (one week) is the performance extremely poor (2% on time) (figures A10.2 and A10.3). In all other situations is the performance stable (75 - 80%). The figure shows that delivery-times longer than 9 weeks have sometimes a poor performance. Due the small number of observations in these categories is the reliability of these figures low. Relatively short requested delivery-times do not have a worse performance than any other. The reason that these orders perform well is because extra attention is paid to complete them on time. Extra effort was needed.
   You may conclude that the ESCC can deliver within 2 weeks just as asked by ECE and Telefonica when more attention is paid.

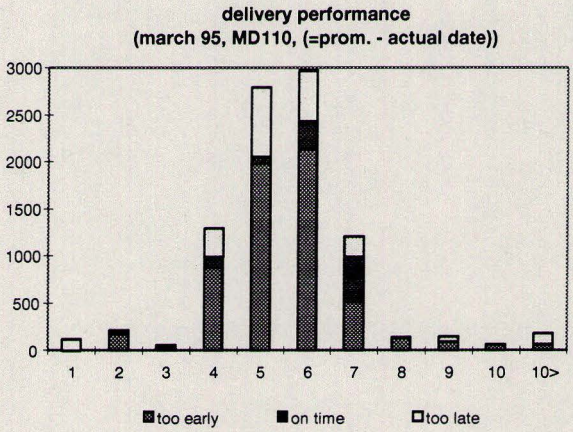


figure A10.2: Delivery performance ESCC

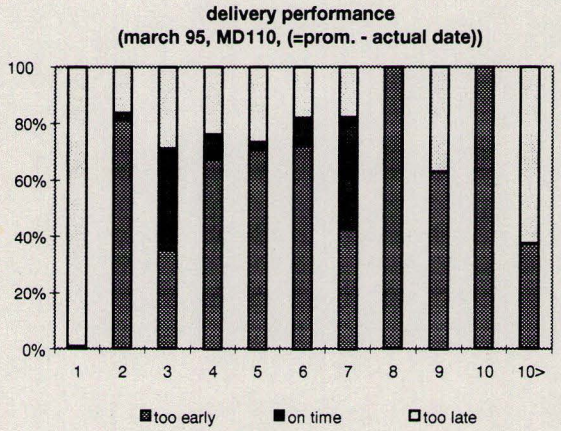


figure A10.3: Delivery performance ESCC

4. ECE has different requests. This local company is responsible for more than half of the project order lines with a requested delivery-time of 2 or 3 weeks (figure A10.4). More than 80% of the order lines asked to be delivered within 3 weeks was ordered by EME. Usually ECE asks for a delivery time of 6 weeks just as any other local company.

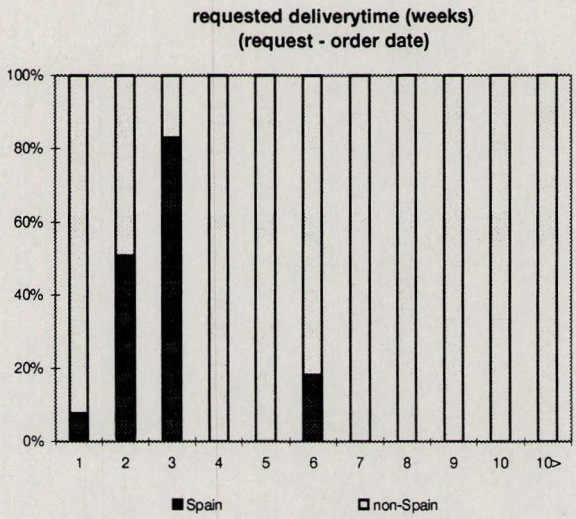


figure A10.4: Requested delivery-time in weeks (Spain and non-Spain)

APPENDIX 11: FOUR LEVELS OF PERFORMANCE-INDICATORS [16]

The distinction of the performance-indicators in four categories is based upon the level of detail. The relationships between the four levels are summarised in figure A11.1.

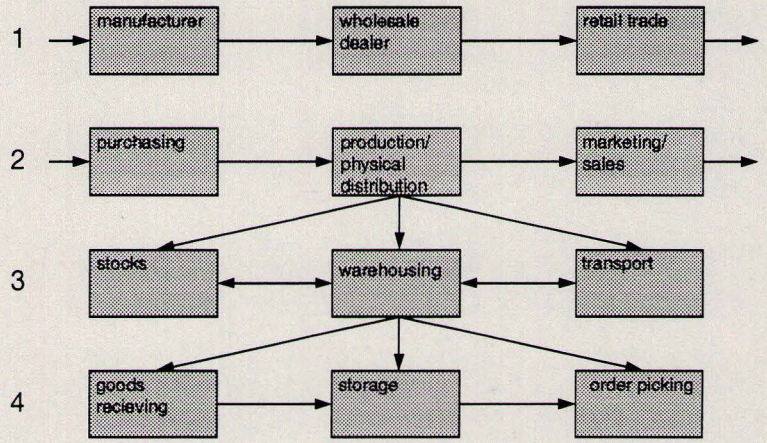


figure A11.1: 4 different levels of performance measurements

1. Performance measurement between the links in the production chain.
   The main question is: How does the link perform as one object? The internal process is conceived as a black-box. Only the link's output is measured. This is the most important level of performance measurement discussing the total value chain.

2. Performance measurement of each function at any link.
   At each link we distinguish a several number of functions. For example sourcing, production and marketing. What is measured is the performance of the most important functions at any link.

3. Performance measurement of the subsystems for each function or department.
   Performances concerning for example physical distribution can be divided in several categories: stock levels, warehouse activities such as handling and transport. This level of performance measurement is a specification of the preceding level of measurement.

4. Performance measurement per activity.
   This is the most detailed level of performance measurement. The previous category is the aggregate of data collected at this category.

Especially the most aggregate level (1) is interesting while designing or evaluating a logistic structure because several links are involved. Table A11.1 reflects a large number of performance indicators described by Robesson. The ones that are used in this project are marked by a *.

Objective	Measurement
Product availability	Item availability Product category availability Correct number of order lines* Right number of items per order lines* Completeness of the order*
Lead-time of the order	Order entry Order processing Total lead-time*
Reliability	Of the promised lead-time* Of the product quality* Of the packing
Information	Order status Tracking and tracing Subsequent delivery Product information Complains dispatch
Flexibility	Rush orders* Changes of customer's orders* Special packing
Service	Installation Repair Spare parts availability Preventive maintenance

** executed measurements*

table A11.1: Performances
Source: Robeson (1985)

Robesson considers costs not as being a performance. This is understandable because costs are elements of the measurements at lower levels (2 and 3).

APPENDIX 12: ECE'S EMPLOYED CAPITAL

total overview

percentage

							mat.	code	
ECE	100%	ZPBM	66%	stock	finished products	32%	printed boards	601	25%
		ZPBO	26%	WIP	expedition	38%	finished products	602	13%
		ZBMN	7%		quality check	1%	cables	603	6%
		ZDNS	1%		installation	7%	phones	604	13%
				goods in transit		23%	AXE/MD110-mat.	607	6%
		ECE	100%				Mega-talk &	609 &	1%
				ZPBM		100%	special products	610	
							Ibercom packages	611	34%
							stock finished products		100%

total overview

percentage

							mat.	code	
ECE	100%	ZPBM	66%	stock	finished products	21%	printed boards	601	5%
		ZPBO	26%	WIP	expedition	25%	finished products	602	3%
		ZBMN	7%		quality check	0%	cables	603	1%
		ZDNS	1%		installation	5%	phones	604	3%
				goods in transit		15%	AXE/MD110-mat.	607	1%
		ECE	100%				Mega-talk &	609 &	0%
				ZPBM		66%	special products	610	
							Ibercom packages	611	7%
							stock finished products		21%

total overview

value (NLG)

							mat.	code	
ECE	12,056	ZPBM	7,987	stock	finished products	2,523	printed boards	601	643
		ZPBO	3,167	WIP	expedition	3,028	finished products	602	338
		ZBMN	809		quality check	50	cables	603	156
		ZDNS	94		installation	580	phones	604	318
				goods in transit	goods in transit	1,804	AXE/MD110-mat.	607	162
		ECE	12,056				Mega-talk &	609 &	20
				ZPBM		7,987	special products	610	
							Ibercom packages	611	866
							stock finished products		2,503

APPENDIX 13: ORGANISATIONAL BORDERS

ANALYSIS CURRENT SITUATION

organisation: supplier/ESCC:
border
parties involved: 50/1
raison d'être: self-evident
objections: -
maintain: yes,
-select more suppliers for the same products to become less dependent
-upstream integration

organisation: EBC/ESCC(RLC):
border
parties involved: 1/4
raison d'être: historical
division of responsibilities
geographical division of production facilities
control, division of priorities and responsibilities:
- EBC: forecast-driven production
- ESCC: order-driven sourcing

number of organisational borders is limited
objections: no integral logistic approach
maintain: yes, division of responsibilities is very important

organisation: ESCC/LC:
borders
parties involved: 1/9
raison d'être: historical
geographical division by market requests
concentration of production and assembly
objections: no integral logistic control:
too many lines of communication
longer lead-times
lower customer service
higher stock-volume
extra control efforts
maintain: no

organisation: supplier/LC:
border
parties involved: 30/1
raison d'être: historical
only locally used material (market requirements)
cheaper
objections: relative high prices due to low volumes
purchase costs are relative high due to low volumes
poor quality control
maintain: reduce number of suppliers by centralisation of purchasing activities
centralise purchasing responsibility (ESCC), removal of the organisational border

APPENDIX 14: STOCK LOCATIONS

ANALYSIS CURRENT SITUATION

location:	EBC
contents:	aggregates
raison d'être:	shared resource
	needed batch size
functions:	decoupling (batch size)
	secure deliveries
objections:	capital employed (finance)
	operational costs (handling, storage capacity)
maintain:	yes
measures:	improved communication (forecast) between RLCs and EBC (interface organisation)
location:	ESCC
contents:	aggregates
raison d'être:	shared resource
	decoupling forecast driven production and order-driven supply
functions:	safety stock
	supply assembly process
	supply ad-on deliveries
objections:	capital employed (finance)
	operational costs (handling, storage capacity)
maintain:	yes
measures:	improve integration of control, upstream as well as downstream
location:	ESCC
contents:	logistic packages
raison d'être:	short delivery-time
functions:	secure short delivery times to Spanish market
objections:	capital employed (finance)
	extra assembly-activities
	operational costs (handling, storage capacity)
maintain:	no
measures:	customise projects in Rijen (assembly)
	shorten the lead-times
location:	ECE
contents:	aggregates
raison d'être:	used for re-assembly (customising)
	local sourced material
	short lead-times, service purposes
functions:	supply add-on material
	supply service
	supply re-assembly
	store local sourced material
objections:	capital employed (finance)
	operational costs (handling, storage capacity)
maintain:	reduce, move to ESCC if possible
measures:	reduce lead-time ESCC
	controlled by ESCC
location:	ECE
contents:	logistic packages
raison d'être:	short lead-times
functions:	fast supply
	service purposes
	independence
objections:	capital employed (finance)
	operational costs (handling, storage capacity)
maintain:	no
measures:	stop local re-assembly activities

APPENDIX 15: INFO-INFRA-STRUCTURE

This appendix shows a global overview of the way information can be exchanged in the new RLC-concept. The information that has to be exchanged is summarised in figure A.15.1.

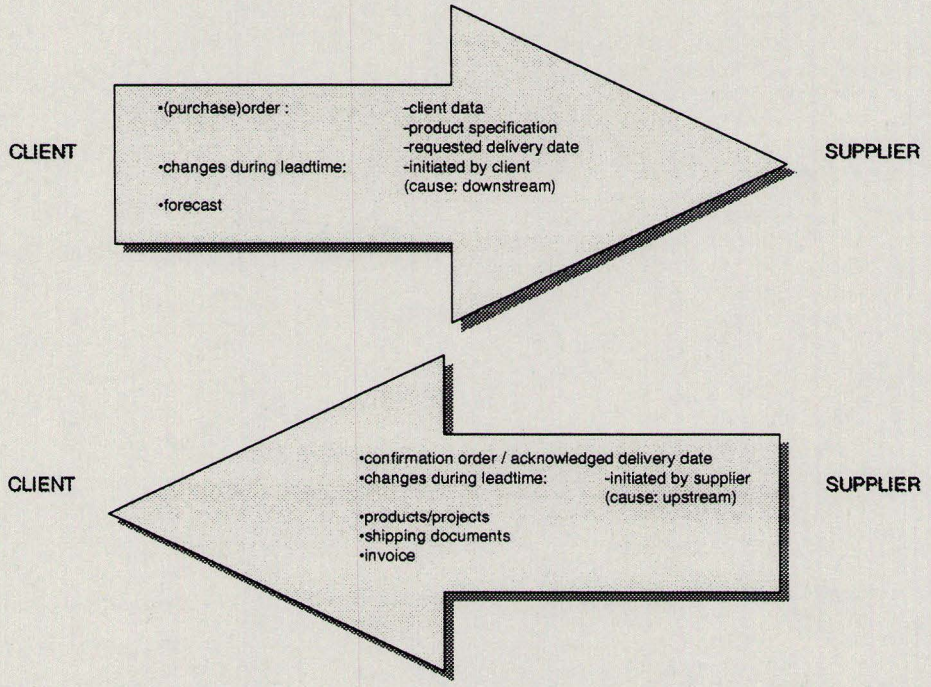


figure A15.1: Exchanged information

Order flow
The order flow is represented in figure A15.2. This flow can be simplified enormously when ECE, ESCC/E and ESCC all use the same production-control-system. This is a realistic possibility when the logistic module of SAP is introduced in the first quarter of 1996. Intake of the order at ECE will be enough to activate the process at the ESCC/E and ESCC without unnecessary interventions. SAP will take care of the conversion of purchase-orders into customer-orders and a lot of the juridical necessary activities. An investment in SAP by ECE might be preferable to adjustments of the current systems.

In the mean-time the ESCC's production control system COPICS and ECE's sales administration system PB will be connected so the information intake can take place in one handling. This feature is determines the next procedure.

Order flow

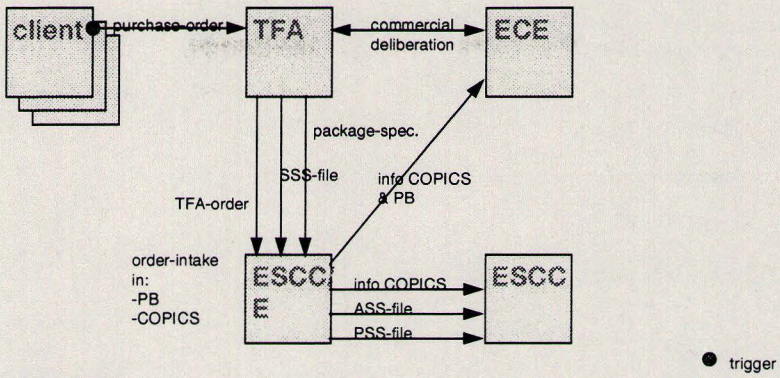


figure A15.2: Proposed order flow

TFA (Telefonica)
objective
selling projects

interfaces
trigger: customer-order of an end-user
product: of the negotiations is: a TFA-order
(including requested delivery date)
input: SSS-tool (for specification purposes)
output: SSS-file, specification takes place during negotiations
package-specification (current SSS-tool can not be used for specification because the price-lists is incorrect)

activities
negotiation
specification functionality in material with SSS-tool
creditability check

alternative
- SSS-file directly sent to ECE's sales department

pro:
-only sales people are involved

con:
-two departments involved with order-intake (sales and intake)

alternative
- use of packages

pro:
-discount for TFA

con:
-doe not fit into ESCC's standard process
-current SSS-tool can not be used for financial purposes

ECE (I)
objective
sales support (sales responsibility)

interfaces
trigger: negotiations and questions TFA
product: answers
input:
output:

activities
sales support

alternative
- SSS-file direct to ECE

pro: see TFA

con:

ESCC/E
objective
order co-ordination

interfaces
trigger: customer-order of TFA
product: specification in COPICS
input: SSS-file
output: SSS-file
ASS-file, allocation of resources
PSS-file, lay-out of the project
requested delivery date

activities
order-receiving
take over the EME-order-number and project-number
specify ASS-file
specify PSS-file
intake in COPICS

The reason to specify the PSS-file in this stage is because this information is used to correct the ASS-file.

ESCC
objective
planning projects (sourcing)

interfaces
trigger: specification in COPICS
product: promised date
input: requested delivery date
output: actual MPS

activities
checking MPS
planning
availability check (has to be done in Rijen because close contacts with planning department)
appoint a delivery date

ECE (II)
objective
starting administrative process in PB including order-registration and installation preparations

interfaces
trigger: customer-order-information from COPICS
product: purchase-order, generated by PB
input: TFA-order
(SSS-file)
(ASS-file)
output: installation-order

activities
order-intake in PB

alternative
- if there has to be a purchase-order, specify this as late as possible (after the project is installed)

pro: con:
-no changes in the purchase-order

alternative
- if there has to be a purchase-order, specify this at the highest level of aggregate for instance at project-level

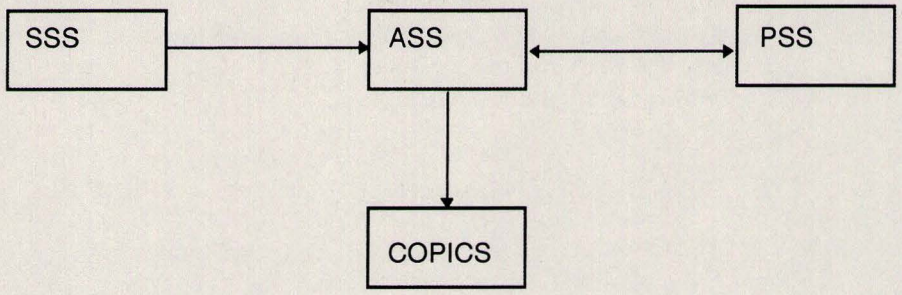
pro: con:
-less specification -possibility depends on juridical aspects

alternative
- if there has to be a purchase-order, let ESCC specify and print it on ECE-paper

pro: con:
-ESCC has the information

remarks

- relationship between the tools:



- It is possible that TFA uses the SSS-tool. The PTT in The Netherlands has also used this tool in the past. The problem that has occurred in the Netherlands was that the tool was often not up-to-date. This is the point of concern. The reason that a tool has to be up-dated are the technical changes and new releases. Furthermore the users often want that the tool is adjusted according their requests.
- The maintenance of the tools has to be centralised.

Confirmation
There are two alternatives:

- no contractual agreements: confirmation can only be initiated by ESCC because this party is responsible for the sourcing
- contractual agreements: based upon standard agreed delivery-times it is possible for links downstream the order-flow to confirm orders without intervening of the parties upstream

pro.	con.
-speeding up the process direct feedback	-sub-routine has to be implemented when requested - delivery time is less then standard: TFA has to contact ESCC/E, ESCC/E has to contact ESCC-planning. Both lines of communication are telephonic. The verbal agreement is confirmed on paper.

starting situation: contractual agreements:

- requested delivery-time > 30 days: TFA can confirm the requested delivery-date without deliberation with any other party as long as there are no special requirements
- requested delivery-time < 30 days: TFA has to ask for a confirmation

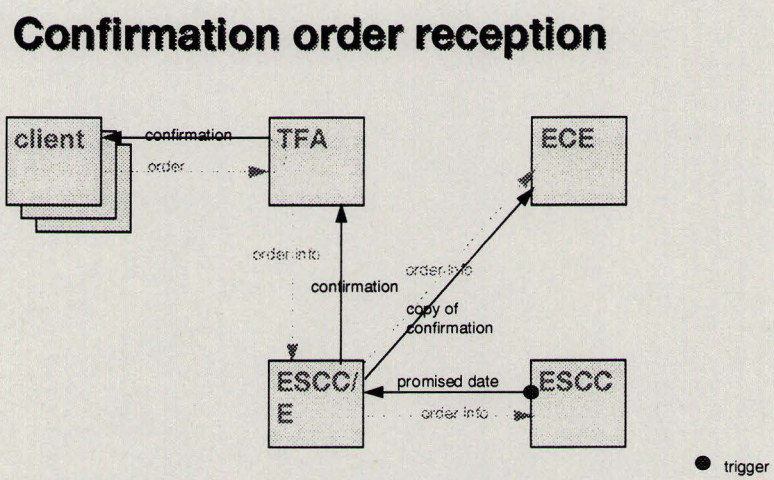


figure A15.3: Proposed confirmation flow

ESCC
objective
appoint promised delivery date

interfaces

trigger:	availability check (end of order-flow)
product:	promised delivery date
input:	MPS
	information COPICS
	information purchasing department
output:	actual MPS

activities
see order-flow ESCC +
if material is not available on time:
-move projects with a lower priority forwards in time
-use substitutes
-promised date > requested date (see start changes during lead-time initiated by Ericsson)
check AB28 (actual shortage)
check AB29 (requirements for the next two weeks)

ESCC/E
objective
confirmation TFA-order)

interfaces

trigger:	delivery-date appointed by ESCC or TFA-order (when delivery-time > 30 days)
product:	confirmation to TFA and copy to ECE
input:	final order-specification in case substitutes are used
output:	confirmation to TFA copy of confirmation to ECE final order-specification in case substitutes are used

activities
receive information from COPICS
give EME copy of confirmation
send TFA confirmation (printed on EME-paper)

ECE
objective
register confirmation

interfaces

trigger:	ESCC/E-confirmation
product:	registration
input:	
output:	confirmation for the installation order

activities
check promised and requested date
plan installation

TFA
objective
confirm customer-order

interfaces

trigger:	client-order (when delivery-time > 30 days) ESCC/E-confirmation (when delivery-time < 30 days)
product:	confirmation to end-user
input:	
output:	

activities
check promised and requested date
confirm order

Changes during process-time

Changes during process-time initiated by Ericsson (figure A15.4)
The spill in this flow is ESCC/E. This department has close contacts with the EME as well as with ESCC. It has no communication problems concerning language and is locally present.
Lack of material and technical problems are the major reasons for Ericsson parties to ask for another delivery time. Another possibility to solve this problem is to use other material than specified.
Initiator in most cases will be ESCC when the availability check or MPS shows that the requested delivery date can not be promised or when a promised date can not be reached because the tests show imperfections.

The flow is suitable in two situations:
- delivery-date < 30 days, confirmation-flow
- during the lead-time an delivery problem occurs

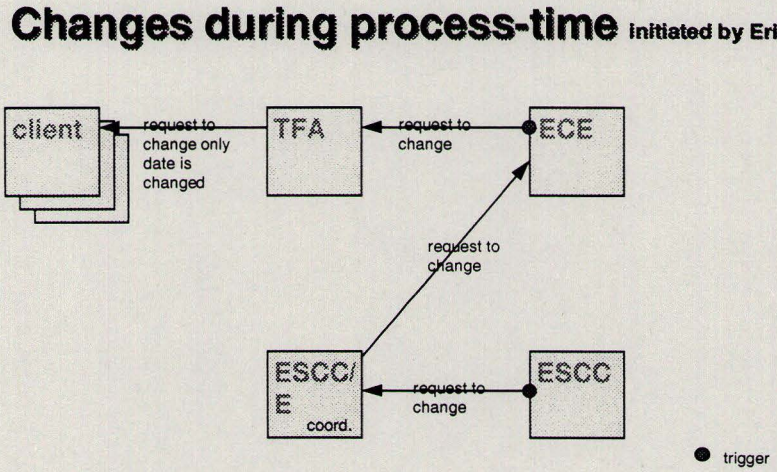


figure A15.4: Proposed information flow for changes during the process-time

Changes during process-time initiated by client (figure A15.5)
The spill in this flow is the ESCC/E. Poor specification can be the reason to change the order during the process-time. This problem can be solved by showing the end-user all possibilities while the order is specified. SSS can help in this situation.
Changes are possible as long as the pick-list hasn't been produced yet (time fence, 2 weeks before shipment). The delivery-date will not change in that situation. The delivery-date depends on the date that the order has been changed. Is the order changed less then 2 weeks before shipping than there has to be mutually deliberation. If the delivery-date can be maintained depends one the impact of the change.

In some cases a new order will be released to make the change possible. The flow is comparable with the order-flow. In all other cases the already existent order will be changed.

Changes during process-time initiated by client

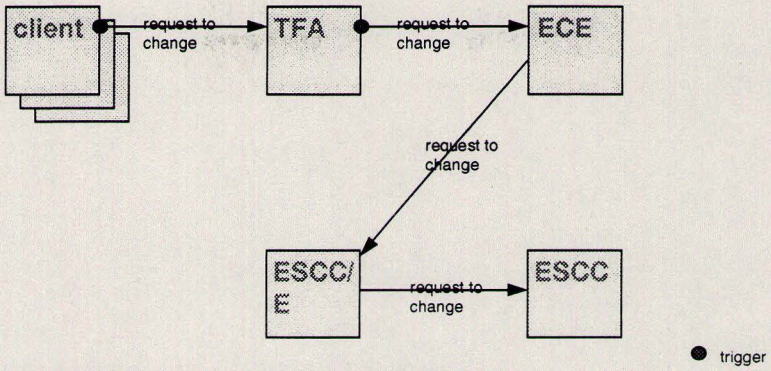


figure A15.5: Proposed information flow for changes during the process-time

Changes during process-time initiated by Ericsson

ESCC
objective
solve delivery problem
causes: lack of material
technical problems (test, new releases)

interfaces

trigger:	lack of material
product:	request to change delivery date
	(other possibility: change specification (upgrading with available material), a request is not necessary as
long as	the functionality of the project does not decrease)
input:	stock-level
	availability-check
	planning
	order status
	alternative items
	information product management
output:	final specification

activities
check availability
look for substitutes and change specification
priority decision, adjust planning

ESCC/E
objective
co-ordination

interfaces

trigger:	request from ESCC
product:	request to EME
input:	
output:	

activities
discus changes with EME

ECE
objective
weigh commercial against Ericsson's interests

interfaces
trigger: request from ESCC/E
product: request to TFA
input:
output:

activities
discus new delivery-date with TFA

TFA
objective
inform the end-user

interfaces
trigger: request from EME
product: request to end-user
input:
output:

activities
discus changes with end-user

remarks
For changes in material is ESCC the decision-maker because the end-user buys functions and no material. The end-user is in most cases not aware of changes in the specification.

APPENDIX 16: STOCK CONTENTS

The requirements and restrictions determine the contents of the local store in Spain and centralised storage at the ESCC. Characteristics that are from any importance are mentioned in figure 6.4. Downstream corresponds to local storage, upstream with centralised in Rijen.

Testing the upstream and downstream forces.
It is not possible to consider all products as being one homogeneous group. Therefor the assortment of the stocks have to be devised in homogeneous families based upon several variables concerning:

- product;
- market;
- process.

It is important that the products in the groups can be considered as being all a like. Each group of articles has to be investigated separately. To find out what the optimal location is for the articles to be stored the next two questions have to be answered.

question 1: *How far can the stock be moved upstream without loosing customers because of poor performances?*

The downstream forces are being neglected for this moment. In this stage will be decided if it is possible to centralise the contents of stocks.

Relevant considerations answering question 1 are:

- time-to-market has to be less then the required delivery time;
- delivery performance of the central stock;
- stock has to be located downstream bottle-necks and unique suppliers.

question 2: *How far can the stock be moved downstream without extreme stock levels or a lot of obsolete products?*

In this case the downstream forces are ignored to investigate if it is possible to decentralise the stock.

Relevant considerations answering question 2 are:

- high stock-levels due to high safety stocks which are necessary because it is more difficult to forecast the local demand then the aggregated sales;
- more obsolete products due to higher safety stocks and unstable demand;
- the stock should be located upstream land and client specific activities;
- local stocks near the central storage have no right to exist;
- articles that are essential for the performance of the final product have to be installed before the product is tested.

Overlaps and gaps
The result of the analysis can be an overlap, meaning that the products can be stored at both locations. The problem that remains is how to choose the best option. On the other hand it may be possible that there is no solution at all. The gap between the two groups of requirements have to be closed by choosing the best out of two bad solutions.

The downstream as well as the upstream forces are moderate in case of an overlap. For instance the time-to-market is long, the value is low and the demand is stable. When there are no expected new requirements out of the market the optimal position can be chosen based upon costs. This will often lead to centralising of the stocks. Another consideration is the impact of the changes on the organisation.

Both forces are emphatic present and choices have to be made in case of a gab. In most cases the market characteristics are the determining factor. How can the gap be closed? When there is no immediate possibility, the problem is no longer logistic but strategic.

In Ericsson's case we can distinction several categories. All articles in the groups have more or less the same characteristics. It might be possible that articles are dedicated to several product families. The distinction is based upon the PMP-variables:

Market
- required time-to-market: depends on: -country
  -product: -project
  -package
  -add-on
  -service material
- is the product used in just one country
- demand: -stable
  -correlation between the sales in different countries

Process
- lead-time from ESCC to L.C.: depends on: -country
- delivery frequency
- is there a possibility to move articles from on stock to another
- how are the products of a local store ordered (B,S),(B,Q),(s,S),(s,Q)

Product
- has the product be assembled before testing
- is the product local sourced
- value
- expected life-cycle time (obsolescence)

As described earlier the use of packages on stock are no longer justifiable. What remains are sub-assemblies and finished goods. Respectively used for assembly and as additional material like telephone sets.

Products that *have to* be stored in Spain are:
- products with a requested time-to-market (two days) which is less than the lead-time (this concerns especially service material and some add-on products).

Products that *have to* stored at the ESCC are:
- products that are needed for customised projects which have to be tested in their final configuration.

All remaining products can be stored at both stores. Where the products will be stored depend on costs. Because the correlation between international sales is low it is preferable to centralise as much as possible to reduce the overall stock levels. The benefits of a centralised stock can partly be reached by integral stock control.

Some products can better be stored at the local stock:
- material that is only locally used (centralisation does not decrease the stocks);
- locally sourced material (costs of transport and handling might be more than costs of storage);
- fast movers (the costs for interest and obsolescence are low due to the high rate-of-circulation and might be less than the costs related to order control (supplies are order related and not forecast related in case of a centralised stock, therefor the number of orders and deliveries are multiplied)

APPENDIX 17: INTEREST

Work In Process

ESCC
- total

current situation:	135,000 NLG
RLC-concept	
11/15 x 135,000	100,000 NLG

ECE

ECE's turnover:	25,300,000 NLG
ECE's (turnover-margin):	21,300,000 NLG
ECE's (turnover-margin):	120,000 NLG / calendar day (= WIP/day)

100% of the material flow moves via expedition (value)
50-60% of the material flow moves via installation (value, assumption)

- installation

current situation (registered):	315,000 NLG
current situation (calculated):	
lead-time x WIP/day x % of the material-flow	
5 x 120,000 x 0,55	315,000 NLG
permanently present (difference)	0 NLG
RLC-concept:	
3 x 120,000 x 0.55	200,000 NLG
permanently present:	0 NLG
reduction:	115.000 NLG

- consolidation:

current situation (registered):	1,510,000 NLG
current situation (calculated):	
lead-time x WIP/day x % of the material-flow	
5 x 120,000 x 1.00	600,000 NLG
registered = 3,020,000 NLG	
permanently present (difference)	910,000 NLG
RLC-concept:	
1 x 120,000 x 1,00	120,000 NLG
permanently present:	0 NLG
total = 120,000	
reduction:	1,390,000 NLG
total reduction	1,605,000 NLG
reduction interest (9%)	145,000 NLG

Goods in transit

ECE's turnover:	25,300,000 NLG	
ECE's (turnover-margin):	21,200,000 NLG	
ECE's (turnover-margin):	120,000 NLG / calendar day (= WIP/day)	
ESCC's turnover:	68,000 NLG / year (ECE-related)	
ECE		
current situation (registered):		900,000 NLG
current situation (calculated):		
lead-time x capital-flow/day		
ESCC to ECE (HUB)		
6 x 68,000 NLG		410,000 NLG
ECE-site		
3 x 120,000 NLG		360,000 NLG
permanently present (difference)		130,000 NLG
RLC-concept:		
lead-time x capital-flow/day		
ESCC to ECE (HUB)		
2 x 68,000 NLG		136,000 NLG
ECE-site		
1 x 120,000 NLG		120,000 NLG
permanently present (difference)		0 NLG
total reduction (year)		644,000 NLG
reduction interest (9%)		60,000 NLG

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USED TERMINOLOGY

Aggregates	Sub-assemblies
ASS	Material specification tool, using the output of the SSS-tool as input
Basic structure	Description of the primary material flow containing: • interfaces; • stock-locations; • shared resources.
CODP *Client Order Decoupling Point*	The location till where client orders have direct influence on the process
EBC	Ericsson Business Networks AB.
EBC/K	Business Unit MD110 Communications Systems; headquarters is located in Bollmora (greater Stockholm area)
EBC/S	Production division of EBC. EBC/S is ESCC's main supplier.
ECE *Espania Comumicaciones de Empresa*	The Spanish Local Company of the Business-division
economy of scale	Capital-intensive means of production can be used more intense leading to decreased costs per item .
economy of speed	Increasing stock-turnover, due centralising of stocks. Centralising leads to less risks caused by unexpected fluctuations in sales or sourcing. The safety-stock can be reduced, causing an increasing stock-turnover.
EDEN *Ericsson Distribution European Network* The via advantage transport	In 1991 EDEN was founded. EDEN arranges transports between large Ericsson companies in Western Europe regardless the business area, according fixed schedules. The so-called Hub-and-Spoke concept is used. The distribution hub is located in Aken. transport itself is soured out. Daily lorries from and to the local companies and Swedish factories are co-ordinated and redirected the hub with very tight and precise time schedule. The big of this working method is a high loading percentage, reliable times and efficient administration.
ESCC *European Supply and Customizing Centre*	Ericsson's VAL-centre for the European market
ESCC/E *European Supply and Customizing Centre Espania*	ESCC's subsidiary in Spain
ESCC/X *European Supply and Customizing Centre*	An arbitrarily subsidiary of ESCC
ETM *Ericsson Telecommunicatie B.V.*	Ericsson's Major Local Company in the Netherlands, located in Rijen

GS *Group Switch*	Connection device used to couple larger MD110 systems
Ibercom package	Standardised LIM build for the Spanish market only. There are 32 different Ibercom packages.
LC *Local Company*	Local (sales) organisation
LIM *Line Interface Module*	A single entity of the MD110
Logistic package	A basic Ibercom package which is produced on forecast.
MD110	Ericsson's communications device, designed to function in business environments, serving the market segment > 100 lines
MLC *Major Local Company*	Important local company directly controlled by the CEO, not belonging to just one business area
PSS	Tool used for designing the lay-out of the LIMs, using the output of the ASS-tool as input
RLC *Regional Logistic Centre*	Ericsson's VAL-centres (4)
RLC-concept	Ericsson's VAL-concept
SSS	Tool used for the functional specification of projects